United States Department of Agriculture

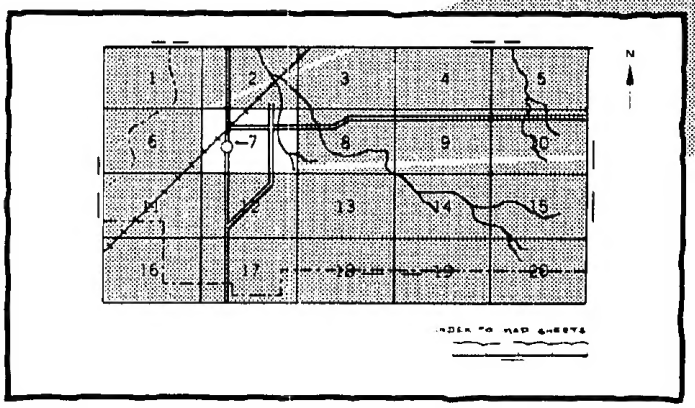
Soil Conservation Service

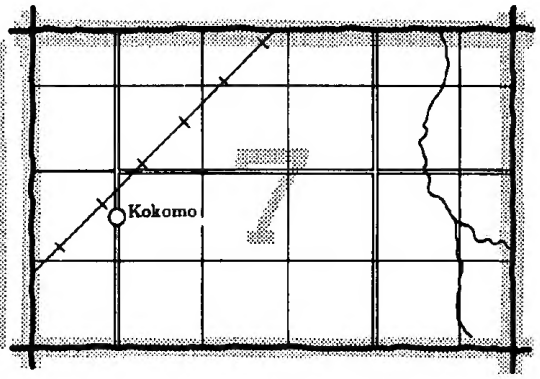
In cooperation with Illinois Agricultural Experiment Station

Soil Survey of Monroe County, Illinois

HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets."





2. Note the number of the map sheet and turn to that sheet.

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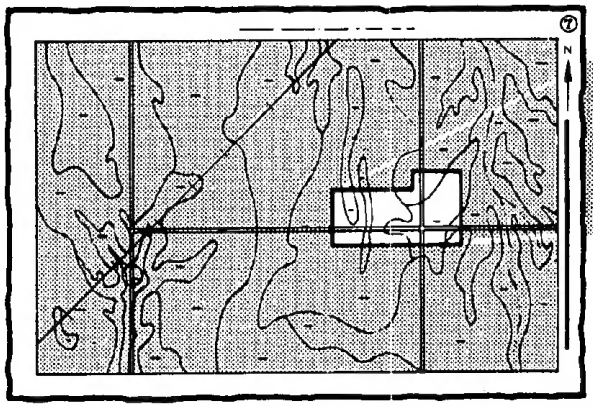
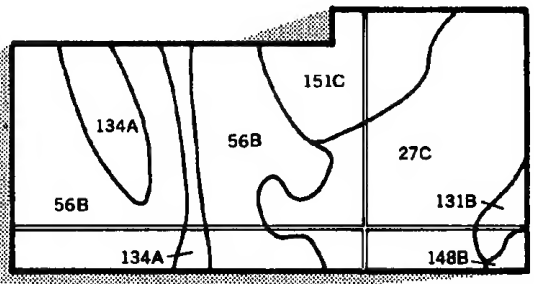
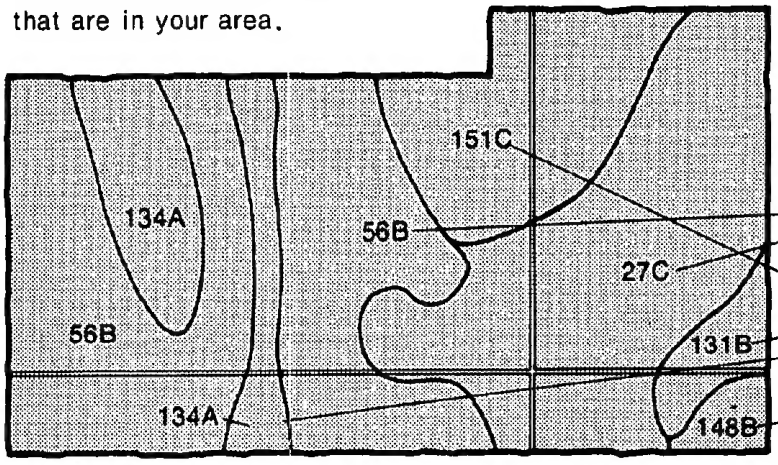




4. List the map unit symbols that are in your area.



Symbols

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56B
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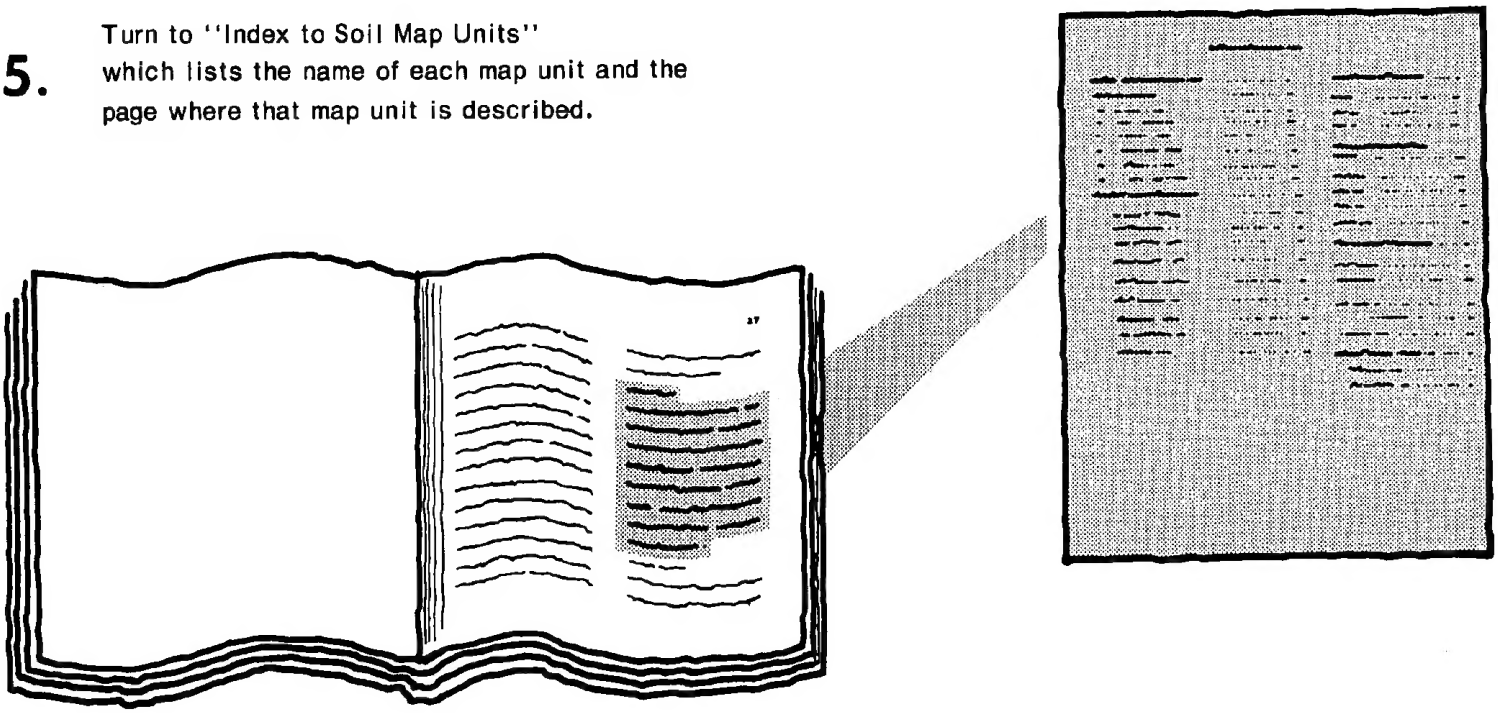
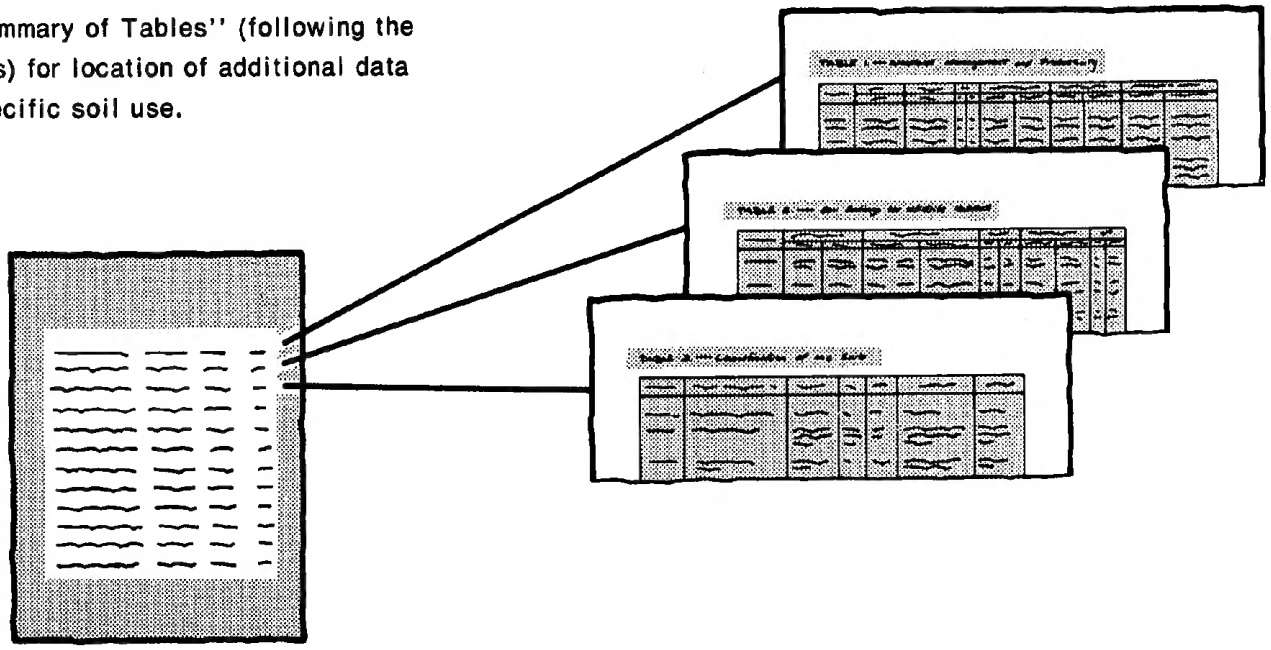
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in June 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. The cost was shared by the Monroe County Board. The survey is part of the technical assistance provided to the Monroe County Soil and Water Conservation District. It is Illinois Agricultural Experiment Station Soil Report No. 126.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Limestone outcrops along the bluff overlooking bottom lands called the Great American Bottoms.

Contents

Soil Series

Issued May 1987

Index to Map Units

Summary of Tables

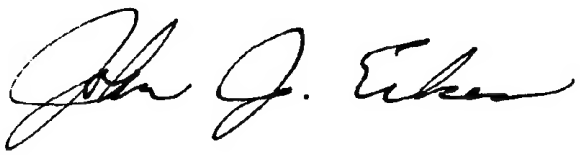
Foreword

This soil survey contains information that can be used in land-planning programs in Monroe County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



John J. Eckes
State Conservationist
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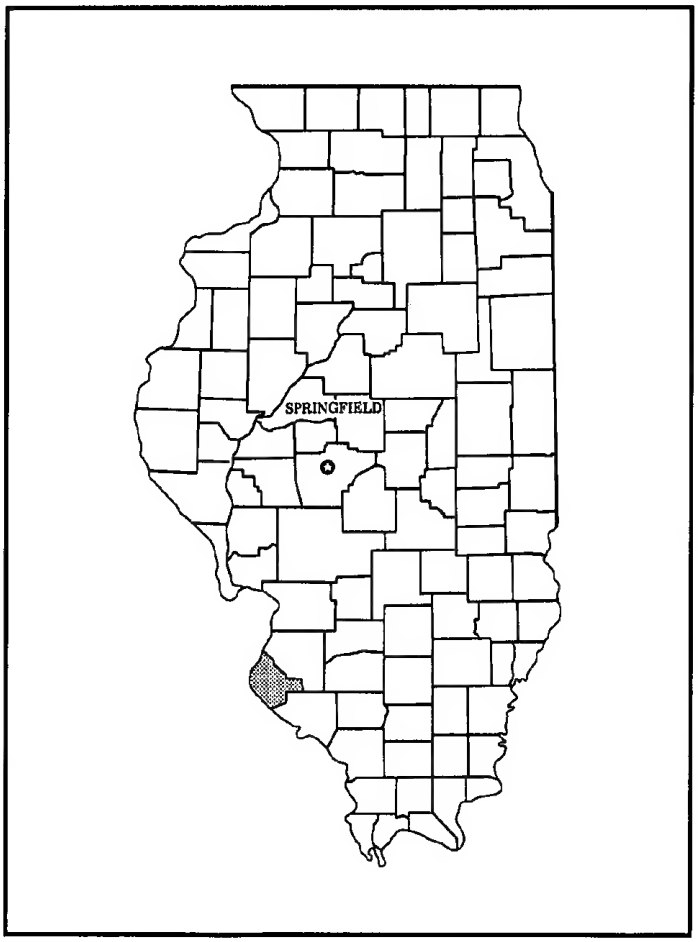

Location of Monroe County in Illinois.

Soil Survey of Monroe County, Illinois

By S.K. Higgins, Soil Conservation Service

Fieldwork by S.K. Higgins and R.J. Moore, Soil Conservation Service, and R.J. Christ and D.E. Leach, Monroe County

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Illinois Agricultural Experiment Station

MONROE COUNTY is in the southwestern part of Illinois. It has an area of 250,240 acres. It is bordered on the west by the Mississippi River, on the northeast by St. Clair County, and on the south by Randolph County. In 1980, the population of the county was 20,117, and that of Waterloo, the county seat and largest city, was 4,646 (*4*). Other towns and villages in the county are Columbia, Fults, Hecker, Maeystown, Renault, and Valmeyer.

General Nature of the County

The following sections provide general information about the climate, history and development, transportation facilities, natural resources, and relief, physiography, and drainage of Monroe County.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Monroe County is cold in winter and quite hot in summer. Winter precipitation, frequently snow, results in a good accumulation of soil moisture by spring and minimizes drought in summer on most soils. The normal annual precipitation is adequate for all crops that are adapted to the temperature and growing season in the survey area.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Waterloo, Illinois, in the period 1961 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 33 degrees F, and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Waterloo on January 17, 1977, is -16 degrees. In summer the average temperature is 76 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred on August 21, 1962, is 107 degrees.

Growing degree days, shown in table 1, are equivalent to heat units. During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual precipitation is 36.6 inches. Of this, 21 inches, or nearly 60 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 16 inches. The heaviest 1-day rainfall during the period of record was 5.96 inches at Waterloo on November 2, 1972. Thunderstorms occur on about 45 days each year. Tornadoes and severe thunderstorms occur occasionally. These storms are usually local in extent and of short duration and cause damage in scattered areas.

The average seasonal snowfall is about 15 inches. The greatest snow depth at any one time during the period of record was 13 inches. On the average, 10 days have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 70 percent of the time possible in summer and 50 percent

in winter. The prevailing wind is from the south. Average windspeed is highest, 9 miles per hour, in spring.

History and Development

In 1787 the area that is now Monroe County was annexed into the Union as part of the Northwest Territory (*3*). It was originally part of Illinois County, then part of St. Clair County. In 1816 Monroe County became the 10th county in Illinois.

A large number of German immigrants came into the county in the mid-1800's. German customs and traditions are still evident in the county.

Agriculture and agribusiness are the major industries in Monroe County. Most of the land is used for agriculture. The metropolitan area of St. Louis, Missouri, is within commuting distance; consequently, the local agricultural economy is increasingly being affected as farmland is converted to urban land.

Transportation Facilities

The transportation facilities available in Monroe County include interstate highways, railroads, buses, and airports. Interstate 255 crosses the northern part of the county and provides quick access to St. Louis, Missouri, and the rest of the interstate system. State Highways 3, 156, and 159 also cross the county. Several county roads provide important transportation links. Most of the secondary township and county roads are blacktopped. Railroads provide freight service through the county. A small airport at Columbia and several smaller landing strips are located in the county. Daily bus service provides a link to the St. Louis metropolitan area.

Natural Resources

Soil is the chief natural resource in Monroe County. About 170,000 acres is used as cropland, and about 3,000 acres is used for pasture (*4*). The main crops are corn, soybeans, and wheat. Other farm products include grain sorghum, barley, hay, fruits and vegetables, cattle, hogs, dairy products, and poultry.

Woodland makes up about 36,000 acres in the county. It is in scattered areas throughout the county, but large tracts are along the major drainageways and near the bluff along the bottom lands called the Great American Bottoms. These wooded areas provide a source of wood products as well as habitat for wildlife.

There are approximately 1,500 ponds and reservoirs and about 230 miles of streams in the county. These water areas provide opportunities for fishing.

Subsurface natural resources include water, limestone, and oil. Adequate water supplies for farm and domestic uses are available in most parts of the county. In small areas where aquifers are deep, however, an adequate supply is difficult to obtain. The county has several limestone quarries. The limestone is used for agricultural lime and in construction. A number of wells produce crude oil.

Relief, Physiography, and Drainage

About two-thirds of the soils in the county are on uplands, which are mostly loess-covered, Illinoian glacial till plains. The thickness of the loess ranges from more than 100 feet along the bluffs to less than 10 feet in the eastern part of the county. About 15,000 acres of the uplands has a karst topography. This consists of conical depressions, called sinkholes or sinks, and interconnecting ridges. Most depressions are open at the bottom and allow water to drain directly into the underlying creviced limestone bedrock. In the less sloping karst areas, some sinkholes are closed at the bottom.

The alluvial soils on flood plains along the Mississippi River, the Kaskaskia River, and their tributary streams make up about one-third of the county. Also, small areas of alluvial soils are on terraces along the Kaskaskia River.

Elevation of the uplands ranges from about 750 to 400 feet above sea level. Elevation of the flood plains along the Mississippi River ranges from about 380 feet above sea level near the river to 400 feet near the bluff. In many places along the bluff, a nearly vertical escarpment rises 200 to 300 feet above the flood plain.

Monroe County is drained by the Mississippi River on the west and by the Kaskaskia River on the east. A high ridge in the center of the county separates the Mississippi River and Kaskaskia River watersheds. Fountain and Carr Creeks, in the northern and central parts of the county, drain into the Mississippi River. Maeystown, Monroe City, and Fults Creeks flow southwesterly into the Mississippi River. Rockhouse, Long, Richland, and Black Creeks flow easterly into the Kaskaskia River. Horse Creek flows southeasterly into adjacent Randolph County and then into the Kaskaskia River.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other

living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in the survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Because of differences in the extent of the major soils, the names of the associations on the general soil map of this county do not completely agree with those on the general soil maps of the adjacent Randolph and St. Clair Counties. Because the soils are similar, however, these differences do not significantly affect the use of the map for general planning of land uses.

The associations in this county have been grouped for broad interpretive purposes. The following pages describe the four groups and nine associations in the county.

Soil Descriptions

Gently Sloping to Very Steep, Moderately Permeable and Slowly Permeable Soils That Formed in Loess, Glacial Till, or Residuum; on Uplands

These soils are on uplands characterized by ridges that are dissected by drainageways. They also are in small areas of bottom lands along streams. Large areas of these soils have a karst topography.

1. Muren-Alford Association

Gently sloping to moderately steep, well drained and moderately well drained, moderately permeable, silty soils; formed in loess

This association consists of soils on ridges and dissected side slopes (fig. 1). The ridges are gently sloping to sloping and are as narrow as 50 feet in some places and more than 1,500 feet wide in other places. The side slopes are strongly sloping to steep and are 50 to 200 feet long.

This association makes up about 15 percent of the county. It is about 48 percent Muren soils, 44 percent Alford soils, and 8 percent minor soils.

Muren soils are gently sloping to strongly sloping and are moderately well drained. They are on ridges and side slopes. Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsurface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 29 inches thick. In the upper part it is yellowish brown, mottled, friable silt loam. In the next part it is dark yellowish brown, mottled, friable silty clay loam. In the lower part it is grayish brown and strong brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is light brownish gray and strong brown, mottled, friable silt loam.

Alford soils are gently sloping to steep and are well drained. They generally are on the narrower ridges and the steeper side slopes. Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 41 inches thick. In the upper part it is dark brown, friable silt loam. In the next part it is dark brown, friable silty clay loam. In the lower part it is dark brown, friable silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, friable silt loam.

The minor soils in this association are the somewhat poorly drained Blair, Marine, and Wakeland soils. Blair soils formed in silty sediments. Marine soils are on broad ridges below the Muren soils. Wakeland soils are in drainageways and along streams.

Most areas of this association are used for cultivated crops, pasture, or hay. Some areas on the moderately steep side slopes are used as native woodland. The soils are generally well suited to the cultivated crops commonly grown in the county. Corn, soybeans, small grain, and forage crops grow well. Organic matter content is moderate or moderately low. Soil fertility and available water capacity are high. The main management concerns are controlling erosion and maintaining soil tilth and soil fertility.

Some areas of this association are used as sites for buildings and sanitary facilities. The main limitations affecting urban development are the seasonal high water table, the shrink-swell potential, permeability, and slope.

2. Alford Association

Gently sloping to very steep, well drained, moderately permeable, silty soils; formed in loess in areas of karst topography

This association consists of soils on ridges and the side slopes of depressions in areas of karst topography (fig. 2). The ridges are gently sloping to sloping and are 50 to more than 400 feet wide. The side slopes of conical sinkholes are gently sloping to very steep and are 50 to 150 feet long.

This association makes up about 17 percent of the county. It is about 85 percent Alford soils and 15 percent minor soils.

Alford soils are on narrow ridges and on the conical side slopes of sinkholes. Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsoil is friable silt loam about 43 inches thick. In the upper part it is yellowish brown, and in the lower part it is strong brown. The underlying material to a depth of 60 inches or more is dark brown, friable silt loam.

The minor soils in this association are Hickory and Muren soils. Also of minor extent are areas of limestone outcrops. The moderately well drained Muren soils are in landscape positions similar to those of the Alford soils. Hickory soils and the limestone outcrops are on the lower parts of steep and very steep side slopes.

Most areas of this association are used for pasture and hay or are native woodland. The gently sloping and sloping areas are used for corn, soybeans, or small grain. Crops and trees grow well. Soil fertility and available water capacity are high. Organic matter content is moderate or moderately low. The main management concerns are controlling erosion and maintaining soil tilth and soil fertility.

The soils in this association are generally not suited to use as sites for septic tank absorption fields because of the hazard of ground water contamination.

3. Seaton-Hickory-Eden Association

Steep and very steep, well drained, moderately permeable and slowly permeable, silty and loamy soils;

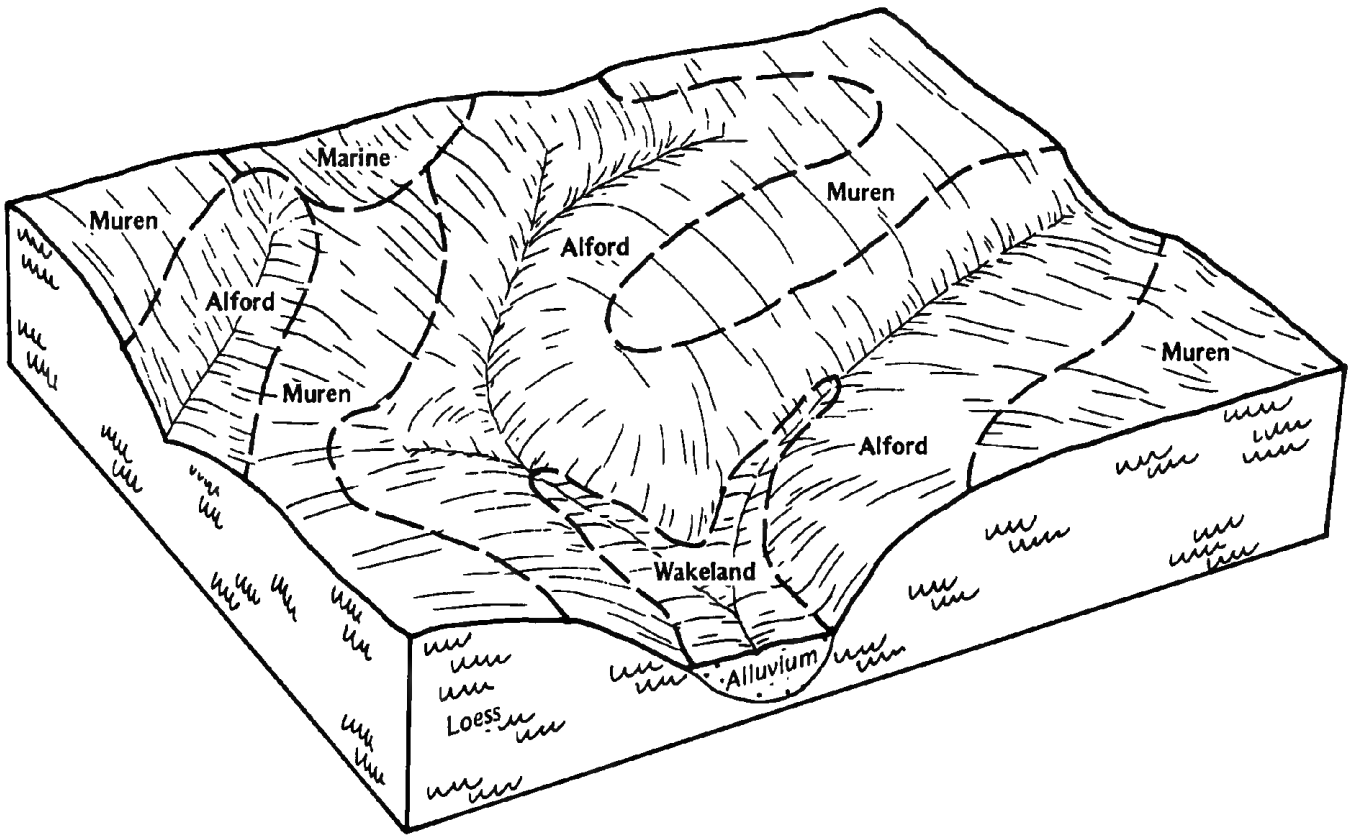

Figure 1.—Typical pattern of soils and parent material in the Muren-Alford association.

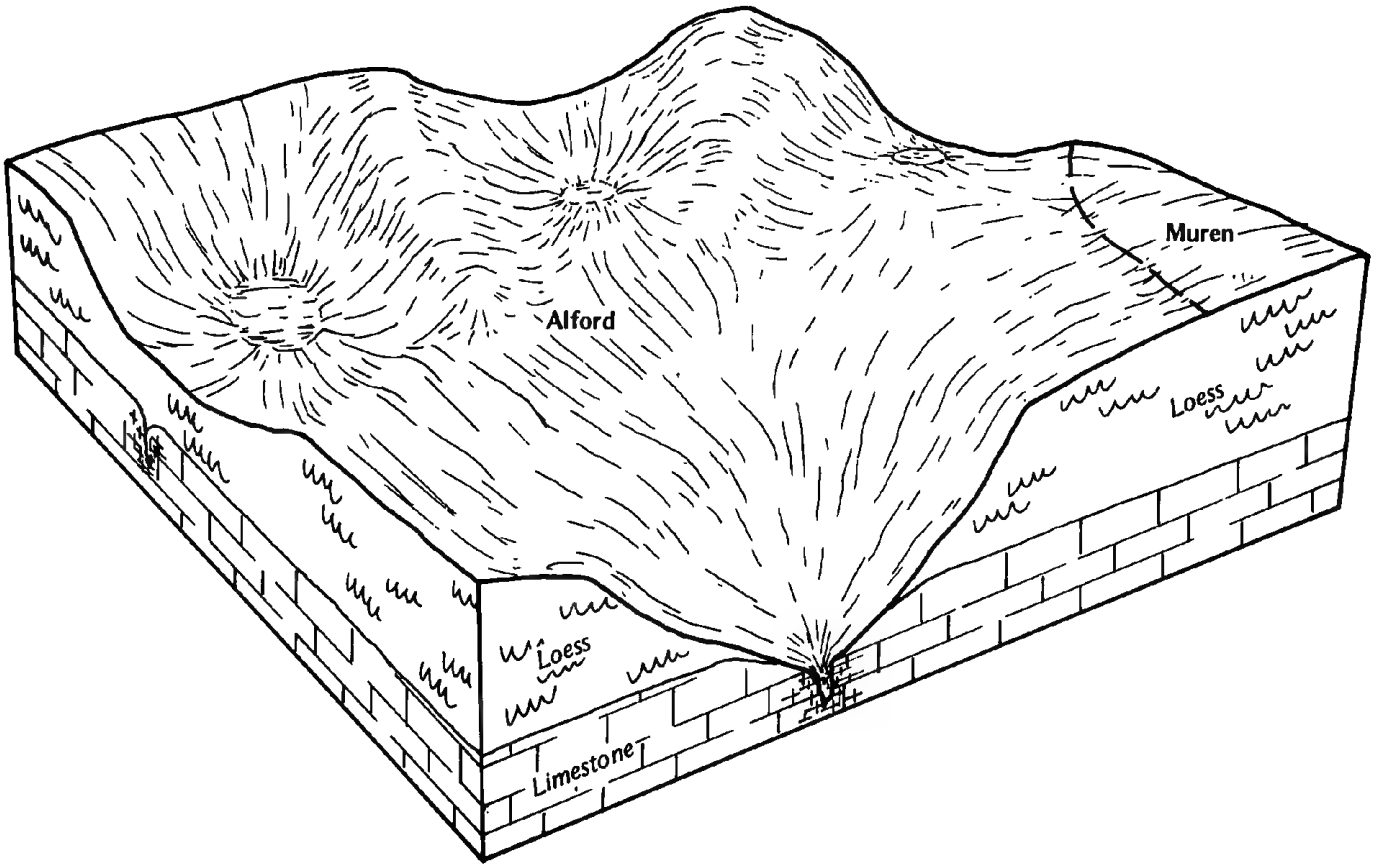

Figure 2.—Typical pattern of soils and parent material in the Alford association.

formed in loess, glacial till, and residuum

This association consists of soils on side slopes and narrow ridge crests. The ridges are 100 to 500 feet wide, and the side slopes are 100 to 800 feet long.

This association makes up about 14 percent of the county. It is about 36 percent Seaton soils, 20 percent Hickory soils, 13 percent Eden soils, and 31 percent minor soils.

Seaton soils are very steep and are on side slopes. Typically, the surface layer is very dark grayish brown, friable silt loam about 1 inch thick. The subsurface layer is dark grayish brown and brown, friable silt loam about 5 inches thick. The subsoil is dark brown, friable silt loam about 54 inches thick.

Hickory soils are steep and are on side slopes. Typically, the surface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 51 inches thick. In the upper part it is yellowish brown, friable clay loam. In the next part it is strong brown, friable clay loam. In the lower part it is brown and strong brown, friable loam.

Eden soils are steep and are on side slopes. Typically, the surface layer is very dark grayish brown flaggy silt loam about 3 inches thick. The subsoil is about 21 inches thick. In the upper part it is dark yellowish brown, friable flaggy silty clay loam. In the next part it is strong brown, firm flaggy and very flaggy silty clay. In the lower part it is strong brown, very firm extremely flaggy silty clay. Limestone bedrock is at a depth of about 24 inches.

The minor soils in this association are Lacrescent, Neotoma, and Westmore soils on side slopes and nose slopes.

Most areas of this association support native hardwoods. A few areas are used for cultivated crops, hay, or pasture. Soil fertility is moderate to high. Organic matter content is moderate. These soils are generally suited to use as woodland and as habitat for woodland wildlife (fig. 3). The main management concerns are the

erosion hazard and the equipment limitation on the very steep slopes.

The soils in this association are generally not suited to use as sites for dwellings and septic tank absorption fields because of the steep and very steep slopes.

Nearly Level to Strongly Sloping, Moderately Slowly Permeable to Very Slowly Permeable Soils That Formed in Loess or Silty Sediments; on Uplands

These soils are on nearly level, broad ridges and gently sloping or sloping side slopes. They are poorly drained or somewhat poorly drained.

4. Blair-Marine Association

Nearly level to strongly sloping, somewhat poorly drained, moderately slowly permeable and slowly permeable, silty soils; formed in silty sediments or in loess

This association consists of soils on broad, nearly level and gently sloping ridges and on eroded side slopes (fig. 4). The ridges are 100 to more than 1,500 feet wide. On the side slopes, the surface layer and most of the subsoil have been removed by erosion. Slopes are 50 to 200 feet long.

This association makes up about 19 percent of the county. It is about 55 percent Blair soils, 28 percent Marine soils, and 17 percent minor soils.

Blair soils are sloping and strongly sloping and are on side slopes. Typically, the surface layer is brown, friable silty clay loam about 5 inches thick. The subsoil is about 55 inches thick. In the upper part it is brown, mottled, firm silty clay loam. In the next part it is brown, mottled, firm silt loam. In the lower part it is gray, mottled, friable silt loam.

Marine soils are nearly level and gently sloping and are on ridges. Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 4 inches thick. The subsoil is about 40 inches thick. In the upper part it is brown, mottled, firm silty clay loam. In the next part it is brown, mottled, firm silty clay. In the lower part it is light brownish gray, mottled, firm and friable silty clay loam and silt loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam.

The minor soils in this association are Banlic, Muren, and Rushville soils. The somewhat poorly drained Banlic soils are in drainageways and along streams. The

Figure 3.—A wooded area of the Seaton-Hickory-Eden association. Lake Mildred is in the foreground.

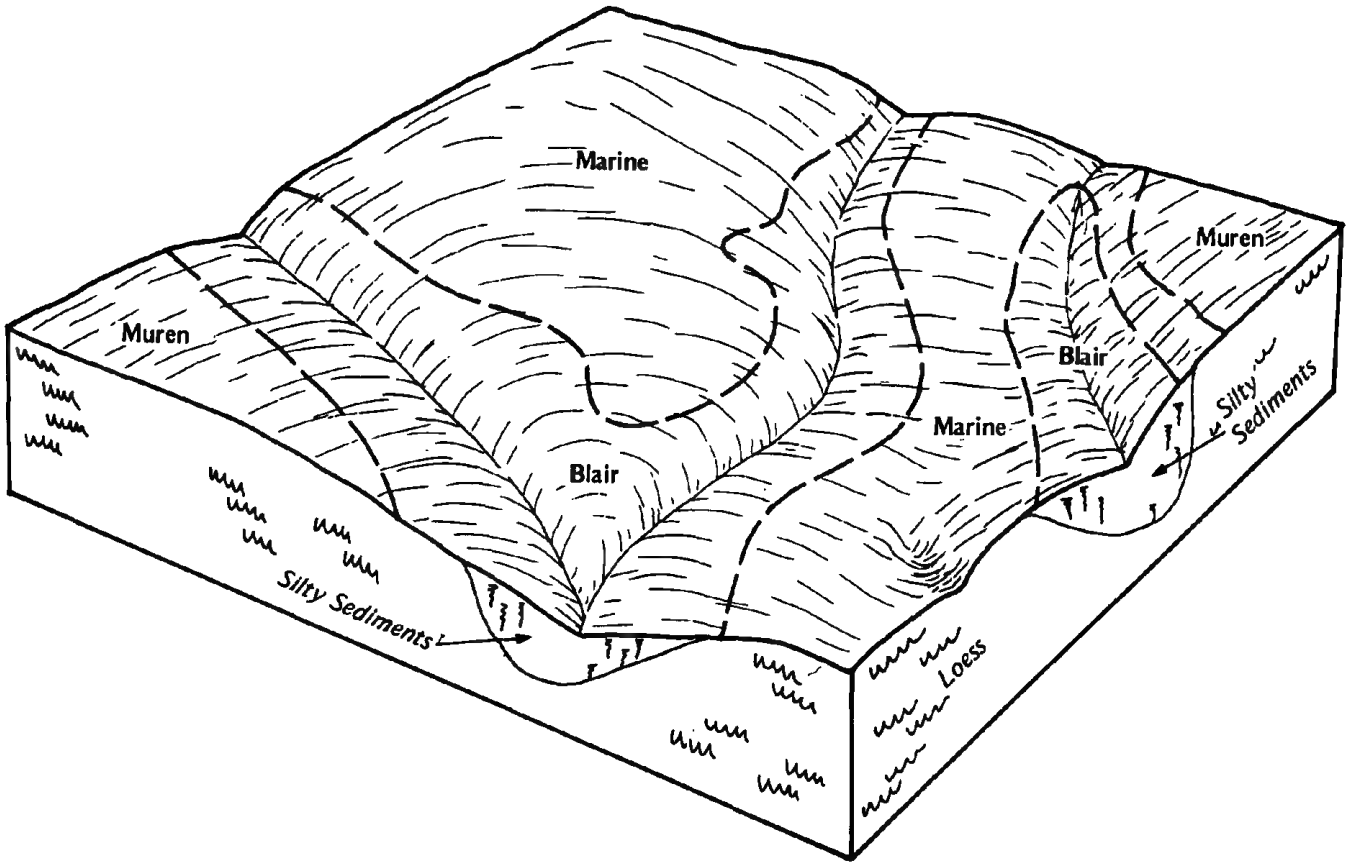

Figure 4.—Typical pattern of soils and parent material in the Blair-Marine association.

moderately well drained Muren soils are on ridges and side slopes above the Marine and Blair soils. The poorly drained Rushville soils are on broad upland divides and in depressions.

Most areas of this association are used for cultivated crops, pasture, or hay. The soils are moderately suited to the cultivated crops commonly grown in the county. Soybeans, sorghum, small grain, and hay grow well. Organic matter content, soil reaction, and soil fertility are low. Available water capacity is moderate, and in some years the soils do not supply enough moisture for some crops during the growing season. The main management concerns are erosion control, soil fertility, a low pH level, available water capacity, low organic matter content, and spring wetness.

The soils in this association are poorly suited to use as sites for dwellings and septic tank absorption fields. The major limitations are the seasonal high water table and permeability.

5. Coulterville-Coulterville Variant Association

Nearly level to sloping, somewhat poorly drained and poorly drained, slowly permeable and very slowly permeable, silty soils; formed in loess

This association consists of soils on ridges, dissected side slopes, and broad, nearly level and depressional interfluves. Some areas have "scalds" or "slickspots," which look like severely eroded spots. The surface layer in these areas has very poor structure because of a high content of sodium. The gently sloping ridges are 100 to more than 1,000 feet wide.

This association makes up about 2 percent of the county. It is about 50 percent Coulterville soils, 25 percent Coulterville Variant soils, and 25 percent minor soils.

Coulterville soils are gently sloping and sloping and are somewhat poorly drained. They are on broad ridges and dissected side slopes. Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 49 inches thick. In the upper part it

is brown and gray, mottled, friable silty clay loam. In the lower part it is gray, light olive gray, olive, and brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is brown, mottled silt loam.

Coulterville Variant soils are poorly drained and are on broad, nearly level and depressional upland divides. Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is grayish brown, mottled silt loam about 3 inches thick. The subsoil is about 48 inches thick. In the upper part it is grayish brown, mottled silty clay loam. In the next part it is light brownish gray, mottled silty clay loam. In the lower part it is gray, mottled silt loam.

The minor soils in this association are Blair, Marine, and Rushville soils. The somewhat poorly drained Blair soils are on the lower side slopes. The somewhat poorly drained Marine soils are on the nearly level and gently sloping side slopes. The poorly drained Rushville soils are on broad flats. None of the minor soils have significant concentrations of sodium in the subsoil.

Most areas of this association are used for cultivated crops. The soils are better suited to such early maturing crops as wheat, soybeans, and sorghum than to corn. Because of the significant amounts of sodium in the subsoil, soil structure is poor and the uptake of plant nutrients is restricted. The soils tend to be droughty in late summer. The main management concerns are the sodium content, the erosion hazard, soil tilth, and soil fertility.

The soils in this association are poorly suited to use as sites for dwellings and septic tank absorption fields. The major limitations are the seasonal high water table and permeability.

Nearly Level to Sloping, Slowly Permeable and Very Slowly Permeable Soils That Formed in Loess and Lacustrine Sediments; on Terraces

6. Colp-Hurst-Okaw Association

Moderately well drained, somewhat poorly drained, and poorly drained, silty soils; formed in loess and lacustrine sediments

This association consists of soils on various terrace levels and short, steep terrace breaks (fig. 5). Areas of these soils are adjacent to flooded bottom lands.

This association makes up about 1 percent of the county. It is about 40 percent Colp soils, 30 percent Hurst soils, 10 percent Okaw soils, and 20 percent minor soils.

Colp soils are nearly level to gently sloping and are moderately well drained. They are on high terraces and on terrace breaks. Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, friable silt loam about 4 inches thick. The subsoil extends to a depth of about 60 inches. In the upper part it is yellowish brown, mottled, firm and very firm silty clay and clay. In the next part it is brown, mottled, firm silty clay loam. In the lower part it is light brownish gray, mottled, friable and firm silty clay loam and silty clay.

Hurst soils are gently sloping and somewhat poorly drained. They are on terraces above the Okaw soils. Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsurface layer is brown and pale brown, friable silt loam about 7 inches thick. The subsoil is about 44 inches thick. In the upper part it is brown, friable silty clay loam. In the lower part it is grayish brown, mottled, firm silty clay.

Okaw soils are nearly level and poorly drained. They are on low terraces. Typically, the surface layer is brown, mottled, friable silt loam about 10 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 7 inches thick. The subsoil is about 43 inches thick. It is grayish brown and mottled. In the upper part it is friable silty clay loam, and in the lower part it is firm silty clay.

The minor soils in this association are the poorly drained Birds and somewhat poorly drained Wakeland soils on flood plains below the Okaw soils.

Most areas of this association are used for cultivated crops. Some of the wetter areas of the Okaw soils occur as native woodland and as habitat for wetland wildlife. The soils are generally suited to the cultivated crops commonly grown in the county. Organic matter content is moderately low. The main management concerns are low fertility, available water capacity, a low pH level, the seasonal high water table, and flooding.

The soils in this association are generally not suited to use as sites for dwellings because of flooding.

Nearly Level and Gently Sloping, Very Slowly Permeable to Rapidly Permeable Soils That Formed in Clayey, Loamy, or Silty Alluvium; on Flood Plains

These soils are on broad bottom lands characterized by swells and low areas. Some areas of the soils are on low terraces and a few terrace breaks. Several alluvial fans are adjacent to the upland bluffs.

7. Wakeland-Wilbur-Birds Association

Nearly level, somewhat poorly drained, moderately well drained, and poorly drained, moderately permeable and moderately slowly permeable, silty soils; formed in silty alluvium

This association consists of soils on low bottom lands next to drainageways and streams. In some areas the landscape is characterized by depressions and short, steep slopes.

This association makes up about 8 percent of the county. It is about 60 percent Wakeland soils, 20 percent Wilbur soils, 10 percent Birds soils, and 10 percent minor soils.

Wakeland soils are somewhat poorly drained and are in upland drainageways and on alluvial fans. Typically,

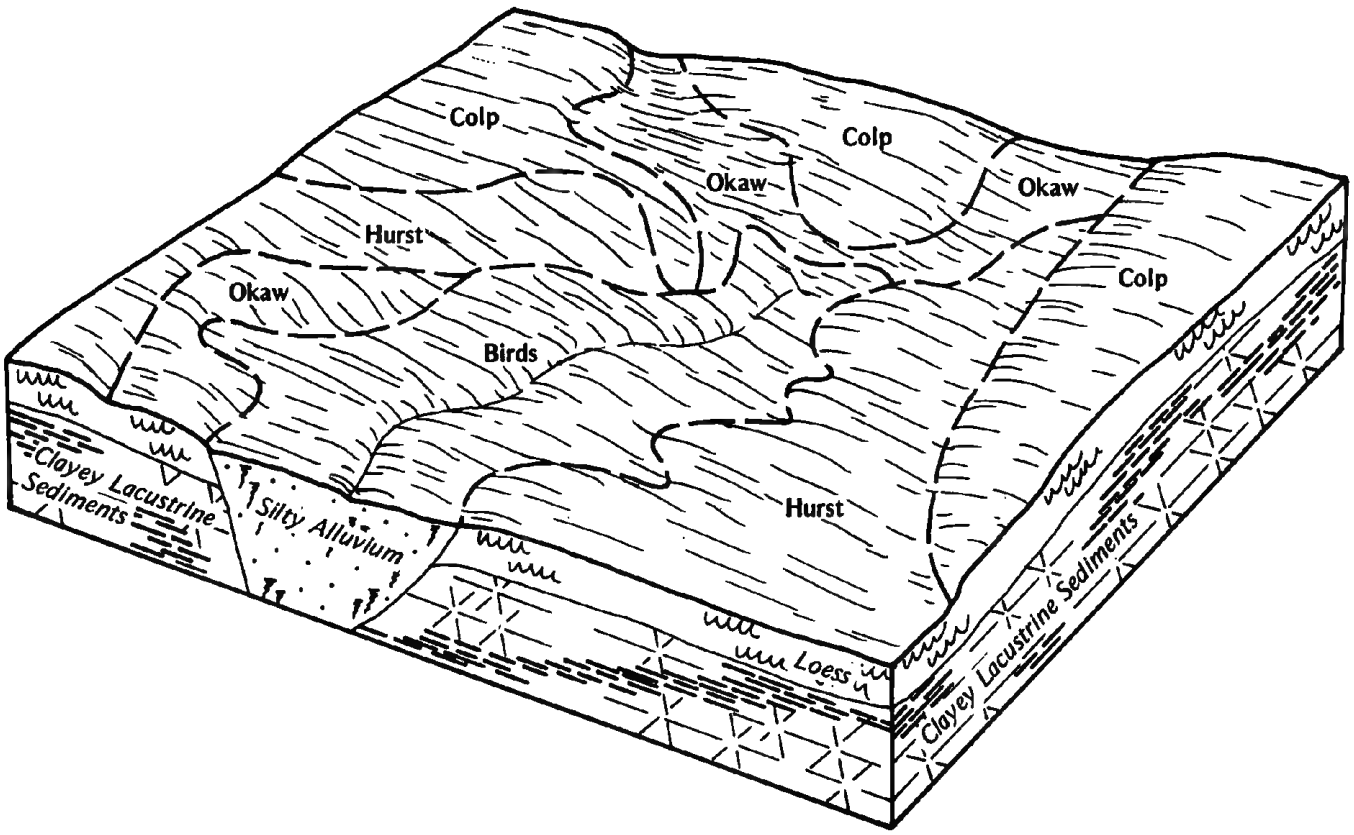

Figure 5.—Typical pattern of soils and parent material in the Colp-Hurst-Okaw association.

the surface soil is dark grayish brown, mottled, friable silt loam about 12 inches thick. The underlying material is grayish brown, gray, and dark grayish brown, mottled, friable silt loam about 48 inches thick.

Wilbur soils are moderately well drained and are slightly higher on the landscape than the Wakeland soils. Typically, the surface layer is brown silt loam about 8 inches thick. The underlying material to a depth of 60 inches or more is brown and dark yellowish brown, friable silt loam.

Birds soils are poorly drained and are in depressions and low areas below the Wakeland soils. Typically, the surface soil is dark grayish brown, mottled, friable silt loam about 18 inches thick. The underlying material to a depth of 60 inches or more is gray, mottled silt loam and silty clay loam.

The minor soils in this association are the well drained Drury and Raddle soils. Drury soils are on foot slopes and alluvial fans adjacent to the bluffs. Raddle soils are on foot slopes and low terraces. Their surface layer is darker colored than that of the major soils.

Most areas of this association are used for cultivated crops. Large areas near the major streams occur as native woodland or as habitat for wetland wildlife. The soils are well suited to the cultivated crops commonly grown in the county. Corn, soybeans, and hay grow well if an adequate drainage system is installed. Organic matter content is moderately low. Available water capacity is high. The main management concerns in the areas used for crops are flooding and the seasonal high water table. Large wooded areas and numerous ponded areas provide abundant habitat for wildlife.

The soils in this association are generally not suited to use as sites for dwellings and septic tank absorption fields because of flooding.

8. Fults-Ambraw-Riley Association

Nearly level and gently sloping, poorly drained and somewhat poorly drained, very slowly permeable and moderately permeable, clayey, silty, and loamy soils; formed in clayey and loamy alluvium

This association consists of soils on bottom lands characterized by swells and low areas. The soils on the swells are gently sloping and are 100 to more than 1,000 feet long. The low areas are nearly level or depressional. A levee along the western edge of the association protects the areas against flooding.

This association makes up about 20 percent of the county. It is about 35 percent Fults soils, 25 percent Ambraw soils, 20 percent Riley soils, and 20 percent minor soils.

Fults soils are nearly level and poorly drained. They are in depressions and low areas. The upper part of the profile is very slowly permeable, and the lower part is moderately rapidly permeable. Typically, the surface soil is very dark gray, very firm silty clay about 12 inches thick. The subsoil is about 30 inches thick. In the upper part it is dark gray, mottled, very firm clay. In the next part it is dark gray, mottled, friable clay loam. In the lower part it is gray, mottled, very friable sandy clay loam. The underlying material to a depth of 60 inches or more is dark gray, mottled sandy loam.

Ambraw soils are nearly level, poorly drained, and moderately permeable. They are in swales. They formed in loamy sediments. Typically, the surface layer is very dark gray, friable silty clay loam about 11 inches thick. The subsoil is about 31 inches thick. In the upper part it is dark gray, mottled, friable clay loam and sandy clay loam. In the next part it is gray, mottled, friable clay loam and very friable sandy clay loam. In the lower part it is dark grayish brown, mottled, very friable sandy loam. The underlying material to a depth of 60 inches or more is gray, friable loam and silt loam.

Riley soils are nearly level and somewhat poorly drained. They are on low ridges and terraces. They formed in loamy sediments. The upper part of the profile is moderately permeable, and the lower part is rapidly permeable. Typically, the surface layer is very dark gray, friable loam about 11 inches thick. The subsoil is about 22 inches thick. It is dark yellowish brown and dark grayish brown and is mottled. In the upper part it is friable clay loam, in the next part it is friable sandy clay loam, and in the lower part it is very friable sandy loam. The underlying material to a depth of 60 inches or more is brown, mottled, loose loamy sand.

The minor soils in this association are the somewhat poorly drained Dupo soils in areas adjacent to uplands and the well drained Landes soils on undulating ridges and terraces.

Most areas of this association are used for cultivated crops (fig. 6). The soils generally are well suited to the crops commonly grown in the county. Corn, soybeans, small grain, and hay grow well. Soil fertility is high. Organic matter content is moderate or high. Available water capacity is generally moderate. The main management concerns are flooding, wetness, soil tilth, and soil fertility.

The soils in this association are generally not suited to use as sites for dwellings and septic tank absorption fields because of flooding.

9. Ambraw-Haynie Association

Nearly level and gently sloping, poorly drained and moderately well drained, moderately permeable, silty soils; formed in loamy alluvium

This association consists of soils on bottom lands that are characterized by swells and low areas and that are between the Mississippi River and a levee. The swells are gently sloping and are 200 feet to more than 1 mile long.

This association makes up about 4 percent of the county. It is about 40 percent Ambraw soils, 35 percent Haynie soils, and 25 percent minor soils.

Ambraw soils are nearly level and poorly drained. They are in swales and depressions. Typically, the surface layer is very dark grayish brown, friable silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very dark grayish brown, dark grayish brown, and grayish brown, mottled alluvium. Textures include silty clay loam, silt loam, loam, loamy fine sand, and fine sandy loam.

Haynie soils are gently sloping and moderately well drained. They are on undulating ridges. Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is stratified silty and loamy alluvium. Strata are dominantly silt loam, but some are loam or silty clay loam.

The minor soils in this association are Aquents and Sarpy soils. Also of minor extent are areas of Riverwash. Aquents are in depressions, old oxbows, and borrow areas next to the levee. Sarpy soils are excessively drained. Riverwash is sandy alluvium deposited along the Mississippi River. Short, steep slopes and cutbanks are common along the river.

Most areas of this association are used for cultivated crops. A few of the wetter areas are wooded and are used as habitat for wildlife. In some areas timber is harvested. Flooding severely limits the use of this association for cultivated crops. In some years crops cannot be planted because of the flooding. In most years short-season soybeans are planted after floodwaters recede. A small acreage of wheat is grown on the highest ridges. Wetland wildlife is abundant. The main management concern affecting most uses is flooding.

Broad Land Use Considerations

The soils in Monroe County vary widely in their suitability for major land uses. More than 65 percent of the acreage is used for cultivated crops, dominantly

Figure 6.—Farmland in an area of the Fults-Ambraw-Riley association on bottom lands called the Great American Bottoms.

corn, soybeans, and wheat. Much of the acreage used for wheat is double cropped with soybeans. In associations 1, 2, 4, 5, 6, 7, 8, and 9, most of the acreage is cultivated.

Erosion is the main hazard if the soils in associations 1, 2, and 4 are used for crops. The major soils in these associations are Alford, Blair, Marine, and Muren soils. Flooding is the main hazard in associations 7 and 9. The major soils in these associations are Ambraw, Birds, Haynie, and Wakeland soils. The seasonal high water table is the major limitation in associations 4 through 9. The major soils in these associations are Ambraw, Birds, Blair, Coulterville, Coulterville Variant, Fults, Hurst, Marine, Okaw, and Riley soils.

A small acreage in the county is used for pasture. All associations, except for 3 and 9, are suited to grasses and legumes. The seasonal high water table is the major limitation if the soils in associations 4 through 7 are used for pasture. Water-tolerant grasses are suitable on these soils.

Nearly 15 percent of the acreage in the county is woodland. Most of the woodland is in association 3, where the soils are dominantly steep and very steep. The major management problem is the equipment limitation. Rock outcrops are common throughout this association. They limit tree growth.

A few areas in the county are developed or built up for urban uses. In general, association 1 is better suited to building site development than the other associations. The limitations in the other associations are slow permeability, the seasonal high water table, and slope. Overcoming these limitations commonly is very expensive. Associations 6 through 9 are generally unsuitable for urban development because of flooding.

Private sewage disposal systems are needed throughout much of the county. The gently sloping Alford soils are well suited to onsite sewage disposal. In areas

of most other soils, the limitations affecting onsite sewage disposal are moderate or severe. The soils in associations 4 and 5 have low potential for this use because of the seasonal high water table, permeability, and slope. Associations 6 through 9 are subject to flooding. The soils in association 2 are generally not suited because of the hazard of ground water contamination, which can occur if the effluent seeps into open sinkholes.

The suitability for recreation uses in the associations ranges from good to poor, depending upon the intensity of the expected use. All the associations are suitable for some recreation uses, such as paths and trails for hiking or horseback riding. Associations 2 and 3 are in scenic areas and have large tracts of woodland that provide a natural setting for paths and trails, camp areas, and picnic areas. Associations 6 through 9 are poorly suited to many of these uses because flooding is a hazard.

The suitability for wildlife habitat generally is good throughout the county. Associations 1, 2, 3, 4, and 5 generally are well suited to use as habitat for openland and woodland wildlife. Associations 6 through 9 generally have good potential for use as habitat for wetland wildlife. Many areas in the county are native woodland and wetlands.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, depth of the seasonal high water table, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alford silt loam, 2 to 5 percent slopes, is one of several phases in the Alford series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. The Westmore-Neotoma complex, 20 to 35 percent slopes, is an example.

Most map units include small, scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Because of differences in the extent of the major soils, the names of the map units on the detailed soil maps of this county do not completely agree with those on the detailed soil maps of the adjacent Randolph and St. Clair Counties. Because the soils are similar, however, these differences do not significantly affect the use of the map for detailed planning of land uses.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

5C3—Blair silty clay loam, 5 to 10 percent slopes, severely eroded. This is a sloping, somewhat poorly drained soil on upland side slopes. The areas are irregular in shape and range from 3 to 80 acres.

Typically, the surface layer is brown, friable silty clay loam about 5 inches thick. The subsoil is about 55 inches thick. In the upper part it is brown, mottled, firm silty clay loam. In the next part it is brown, mottled, firm silt loam. In the lower part it is gray, mottled, friable silt loam. In some places the subsoil has more clay. In other places it has significant amounts of sodium. Some areas have steeper slopes.

Included with this soil in mapping are small areas of the well drained Ursa soils. These soils formed in a fine textured paleosol and are on the steeper slopes at the lower ends of drainageways. They make up less than 10 percent of the map unit.

Water and air move through this Blair soil at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is moderate. Organic matter content is low. Reaction ranges from very strongly acid to medium acid in the

upper part of the subsoil and from strongly acid to mildly alkaline in the lower part. After hard rains, a crust commonly forms on the surface. If this soil is tilled when wet, the surface becomes hard and cloddy. The shrink-swell potential is moderate in the subsoil, and the potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is poorly suited to cultivated crops and moderately suited to pasture and hay. It is poorly suited to use as a site for septic tank absorption fields and for dwellings with basements. It is moderately suited to use as a site for dwellings without basements.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Resource management systems that include crop rotations with 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface, contour farming, terraces, or a combination of these practices help to control erosion (fig. 7). Returning crop residue to the soil helps to reduce crusting and improves soil tilth.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The main limitations affecting the use of this soil as a site for dwellings are the seasonal high water table, shrinking and swelling, and slope. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening the foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. In some areas land

Figure 7.—A grassed waterway in an area of Blair silty clay loam, 5 to 10 percent slopes, severely eroded. The resource management system on this soil includes leaving crop residue on the surface.

shaping by cutting and filling helps to overcome the slope. During construction, leaving as much undisturbed vegetation on the surface as possible helps to control erosion. Disturbed areas should be seeded or sodded.

The limitations affecting the use of this soil as a site for septic tank absorption fields are moderately slow permeability, the seasonal high water table, and slope. Replacing the soil with more permeable material or enlarging the filter field helps to overcome the moderately slow permeability. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes. Subsurface drains help to lower the seasonal high water table.

The land capability classification is IVe.

5D3—Blair silty clay loam, 10 to 15 percent slopes, severely eroded. This is a strongly sloping, somewhat poorly drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is dark brown, friable silty clay loam about 5 inches thick. The subsoil is mottled, friable silty clay loam about 55 inches thick. In the upper part it is dark yellowish brown and brown. In the next part it is grayish brown. In the lower part it is light brownish gray. In some places the subsoil has more clay. In other places the lower part of the subsoil has significant amounts of sodium. Some areas have steeper slopes.

Included with this soil in mapping are small areas of the well drained Ursa soils. These soils have more clay in the subsoil than the Blair soil and are on the steeper slopes at the lower ends of drainageways. Also included are "scald spots," or places where the surface layer has significant amounts of sodium. These spots are on nose slopes and the lower parts of side slopes. They are difficult to vegetate and significantly reduce yields. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Blair soil at a moderately slow rate. In cultivated areas surface runoff is rapid. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is moderate. Organic matter content is low. Reaction ranges from very strongly acid to medium acid in the upper part of the subsoil and from strongly acid to mildly alkaline in the lower part. After hard rains, a crust commonly forms on the surface. The surface layer is easily tilled only within a narrow range in moisture content. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is generally not suited to cultivated crops because erosion is a severe hazard. It is moderately suited to pasture and hay and to use as a site for dwellings without basements. It is poorly suited to use as a site for septic tank absorption fields and dwellings with basements.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till planter helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The limitations affecting the use of this soil as a site for dwellings are the seasonal high water table, the moderate shrink-swell potential, and the slope. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Extensive land shaping by cutting and filling is needed to prepare building sites. During construction, leaving as much vegetation on the surface as possible helps to control erosion. Seeding or sodding disturbed areas also helps to control erosion.

The limitations affecting the use of this soil as a site for septic tank absorption fields are the moderately slow permeability, the seasonal high water table, and the slope. Replacing the soil with more permeable material or enlarging the filter field helps to overcome the moderately slow permeability. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes. Subsurface drains help to lower the seasonal high water table.

The land capability classification is VIe.

7D3—Atlas silty clay loam, 10 to 15 percent slopes, severely eroded. This is a strongly sloping, somewhat poorly drained soil on upland side slopes. The areas are irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is brown, friable silty clay loam about 9 inches thick. The subsoil is about 51 inches thick. In the upper part it is yellowish brown and gray, mottled, firm silty clay loam. In the lower part it is gray and strong brown, mottled, firm silty clay. In places the upper part of the soil is silt loam. In some areas the subsoil has less clay.

Included with this soil in mapping are small areas of the well drained Hickory, moderately well drained Muren, and well drained Ursa soils. Hickory soils are on the steeper side slopes. Muren soils formed in loess and are on the upper parts of slopes and at the upper ends of drainageways. Ursa soils are on the steeper side slopes. The included areas make up 10 to 15 percent of the map unit.

Water and air move through this Atlas soil at a very slow rate. In cultivated areas surface runoff is rapid. The seasonal high water table is within 2 feet of the surface in spring. Available water capacity is moderate. Organic matter content is low. Reaction in the subsoil ranges

from medium acid to mildly alkaline. After hard rains, a crust commonly forms on the surface. The surface layer is easily tilled only within a narrow range in moisture content. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is generally not suited to cultivated crops because erosion is a hazard. It is moderately suited to pasture and hay. It is poorly suited to use as a site for septic tank absorption fields and dwellings.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till planter helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The limitations affecting the use of this soil as a site for dwellings are the seasonal high water table, the high shrink-swell potential, and the slope. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Extensive land shaping by cutting and filling is needed to prepare building sites. During construction, leaving as much undisturbed vegetation on the surface as possible helps to control erosion. Seeding or sodding disturbed areas also helps to control erosion.

The limitations affecting the use of this soil as a site for septic tank absorption fields are the very slow permeability, the seasonal high water table, and the slope. Replacing the soil with more permeable material helps to overcome the very slow permeability. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes. Subsurface drains help to lower the seasonal high water table.

The land capability classification is VIe.

7E3—Atlas silty clay loam, 15 to 20 percent slopes, severely eroded. This is a moderately steep, somewhat poorly drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 30 acres.

Typically, the surface layer is dark brown, friable silty clay loam about 5 inches thick. The subsoil is about 49 inches thick. In the upper part it is strong brown, mottled, firm silty clay. In the next part it is yellowish brown and grayish brown, mottled, firm clay loam. In the lower part it is brown, mottled, firm clay loam. The underlying material to a depth of about 60 inches is brown, mottled loam. In some of the less eroded areas, the surface layer is silt loam. In other areas the seasonal high water table is more than 2 feet below the surface. In places the subsoil has less clay.

Included with this soil in mapping are small areas of the well drained Hickory, moderately well drained Muren, and well drained Ursa soils. Hickory soils are on the steeper side slopes. Muren soils formed in loess and are on the upper parts of slopes and at the upper ends of drainageways. Ursa soils are on the steeper side slopes. Also included are areas where bedrock crops out near the base of slopes. The included areas make up 10 to 15 percent of the map unit.

Water and air move through this Atlas soil at a very slow rate. In cultivated areas surface runoff is rapid. The seasonal high water table is within 2 feet of the surface in spring. Available water capacity is moderate. Organic matter content is low. Reaction in the subsoil ranges from medium acid to mildly alkaline. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for pasture and hay or is wooded. It is generally not suited to cultivated crops because of the moderately steep slopes and the erosion hazard. It is moderately suited to pasture and hay and to woodland. It is well suited to use as habitat for woodland wildlife and moderately suited to use as habitat for openland wildlife. It is poorly suited to use as a site for septic tank absorption fields and dwellings.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till planter helps to control erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, weed control, and restricted grazing during wet periods help to maintain the pasture.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because of the slope. Other management concerns are seedling mortality and the windthrow hazard caused by the high clay content of the soil. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or to a grass-legume mixture after the completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Planting stock that is larger than typical reduces seedling mortality. Using harvesting methods that do not leave isolated or widely spaced trees and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to reduce windthrow. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire protection prevents damage to trees and maintains the leaf mulch.

This soil has good potential for use as habitat for woodland wildlife and fair potential for use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the moderately steep slopes and

low fertility limit the extent of grain and seed crops. Protection from fire and grazing is essential.

The limitations affecting the use of this soil as a site for dwellings are the seasonal high water table, slope, and shrinking and swelling. Installing tile drains around the base of foundations lowers the seasonal high water table. Extensive land shaping by cutting and filling is needed to prepare building sites. During construction, leaving as much vegetation on the surface as possible and seeding or sodding disturbed areas help to control erosion. Reinforcing foundations and widening the foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling.

The limitations affecting the use of this soil as a site for septic tank absorption fields are the very slow permeability, the slope, and the seasonal high water table. Replacing the soil with more permeable material or enlarging the filter field helps to overcome the very slow permeability. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes. Subsurface drains help to lower the seasonal high water table.

The land capability classification is VIIe.

8F—Hickory silt loam, 20 to 35 percent slopes. This is a steep, well drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 51 inches thick. In the upper part it is yellowish brown, friable clay loam. In the next part it is strong brown, friable clay loam. In the lower part it is brown and strong brown, friable loam. In some places the subsoil has less sand. In other places it has more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Atlas soils on the upper parts of drainageways. These soils have more clay in the subsoil than the Hickory soil. Also included are a few areas of rock outcrops at the base of slopes. The included areas make up 10 to 15 percent of the map unit.

Water and air move through this Hickory soil at a moderate rate. Surface runoff is very rapid. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to neutral. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil supports native hardwood trees. It is well suited to use as woodland and as habitat for woodland wildlife. It is only moderately suited to pasture and generally is not suited to hay because of the steep slopes. It is generally not suited to cultivated crops and to use as a site for septic tank absorption fields and dwellings because of the steep slopes.

If this soil is used for pasture and hay, erosion is a severe hazard, especially during the establishment period. Proper stocking rates, rotation grazing, timely deferment of grazing, weed control, and restricted grazing during wet periods help to maintain an adequate stand of pasture plants.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because of the slope. Another management concern is plant competition, which affects seedlings of desirable species. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. Seeding all bare areas created by logging operations to grass or to a grass-legume mixture after the completion of logging operations also helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland helps to prevent reduction or destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire protection prevents damage to trees and maintains the leaf mulch.

This soil has good potential for use as habitat for woodland wildlife and poor potential for use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the steep slopes and low fertility limit the extent of grain and seed crops. Areas of native hardwoods provide good habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is VIe.

16—Rushville silt loam. This is a nearly level, poorly drained soil on broad upland ridges, at the head of drainageways, and in shallow depressions. It is subject to ponding for brief periods in spring. The areas are irregular in shape and range from 5 to 150 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, friable silt loam about 11 inches thick. The subsoil is about 41 inches thick. In the upper part it is light brownish gray, mottled, firm silty clay loam. In the lower part it is light gray, mottled, friable silt loam. In places the surface layer has more organic matter.

Included with this soil in mapping are small areas of Coulterville Variant and Marine soils. Coulterville Variant soils are in landscape positions similar to those of the Rushville soil. They have significant amounts of sodium in the subsoil. The somewhat poorly drained Marine soils are on ridges and on side slopes along drainageways. The included soils make up 2 to 5 percent of the map unit.

Water and air move through this Rushville soil at a very slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table is 1 foot above the surface to 1 foot below in spring. Available water capacity is moderate. Organic matter content is low. Reaction in the subsoil is very strongly acid to neutral. The surface layer is friable and can be easily tilled throughout a wide range of moisture content. After hard rains, a crust commonly forms on the surface. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of the seasonal high water table, very slow permeability, and ponding.

If this soil is used for corn or soybeans, the seasonal high water table and very slow permeability are limitations. The soil dries slowly in spring, and in some years planting is delayed. Surface ditches remove excess water. A conservation tillage system that leaves crop residue on the surface after planting reduces puddling and crusting. The low reaction in the subsoil restricts root growth and the availability of plant nutrients. Crops respond well to fertilization if the soil is adequately limed. During periods of low rainfall, the amount of available soil moisture may be inadequate for optimum corn yields. Grain sorghum, wheat, and soybean yields are less affected by the reduced amount of available water.

If adequately limed, this soil is suited to pasture and hay. Water-tolerant grasses and legumes are suitable for planting. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth. Installing surface ditches to remove excess water reduces winterkill and frost heave.

The land capability classification is IIIw.

30F—Hamburg silt loam, 20 to 30 percent slopes. This is a steep, somewhat excessively drained soil on loess-covered limestone bluffs. The areas are linear in shape and range from 10 to 50 acres.

Typically, the surface layer is very dark grayish brown, friable, calcareous silt loam about 4 inches thick. The underlying material to a depth of 60 inches or more is friable, calcareous silt. In the upper part it is dark yellowish brown, in the next part it is brown, and in the lower part it is yellowish brown. In places the surface layer is thicker and the subsoil is weakly developed. In some areas the underlying material is not calcareous.

Included with this soil in mapping are small areas of the well drained Lacrescent soils. These soils formed in colluvial sediments that have a high content of coarse fragments. They are downslope from the Hamburg soil. Also included are some areas of limestone outcrops. The included areas make up 10 to 15 percent of the map unit.

Water and air move through this Hamburg soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. Reaction is mildly alkaline or moderately alkaline in the underlying material. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil supports native prairie grasses and is used as habitat for wildlife. It is generally not suited to cultivated crops, pasture, or hay or to use as a site for septic tank absorption fields and dwellings because of the slope.

The land capability classification is VIIe.

70—Beaucoup silty clay loam. This is a nearly level, poorly drained soil on broad flats and in depressions on flood plains along the major rivers. The soil is protected by a levee system but is subject to rare flooding. It is subject to ponding in spring. The areas are irregular in shape and range from 10 to 150 acres.

Typically, the surface soil is very dark gray and very dark grayish brown, mottled, friable silty clay loam about 16 inches thick. The subsoil is mottled, friable silty clay loam about 44 inches thick. In the upper part it is dark grayish brown. In the lower part it is yellowish brown and gray. In places the surface layer and the subsoil have more clay. In some areas the subsoil and underlying material have more sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Riley and Tice soils in the higher positions on the landscape. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Beaucoup soil at a moderately slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below in spring. Available water capacity is high. Organic matter content also is high. Reaction in the subsoil is slightly acid to mildly alkaline. The surface layer is easily tilled only within a narrow range in moisture content. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because flooding is a hazard.

If this soil is used for corn or soybeans, the seasonal high water table delays planting in some years. This soil is protected from flooding by a levee, but it is subject to frequent ponding by surface runoff from adjacent areas. Surface ditches remove excess water. Minimizing tillage and returning crop residue to the soil help to maintain soil tilth and soil fertility and increase water infiltration.

If this soil is used for pasture and hay, the seasonal high water table is a limitation. Water-tolerant grasses

and legumes are suitable. Surface ditches help to remove excess water. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIw.

75B—Drury silt loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on foot slopes. The areas are irregular in shape and range from 10 to 50 acres.

Typically, the surface layer is dark brown, friable silt loam about 7 inches thick. The subsoil is dark yellowish brown, friable silt loam about 36 inches thick. The underlying material to a depth of 60 inches or more also is dark yellowish brown, friable silt loam. In some places the surface layer is darker. In other places the subsoil has more clay. In some areas the underlying material has thin strata of sand.

Included with this soil in mapping are small areas of the moderately well drained Wilbur soils. These soils are in the lower positions on the landscape and in drainageways. Also included are some areas where limestone flagstones are throughout the profile. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Drury soil at a moderate rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderate. Reaction is medium acid to neutral. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay and to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by contour farming and a conservation tillage system that leaves crop residue on the surface after planting.

If this soil is used for pasture, overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The land capability classification is IIe.

75C—Drury silt loam, 5 to 10 percent slopes. This is a sloping, well drained soil on foot slopes. The areas are irregular in shape and range from 10 to 40 acres.

Typically, the surface layer is dark brown, friable silt loam about 9 inches thick. The subsoil is dark yellowish brown, friable silt loam about 36 inches thick. The underlying material to a depth of 60 inches or more is dark brown silt loam. In places the surface layer is darker. In some areas the underlying material has thin strata of sand.

Included with this soil in mapping are areas that have limestone flagstones throughout the profile. The included soils make up 2 to 5 percent of the map unit.

Water and air move through this Drury soil at a moderate rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderate. Reaction is medium acid to neutral. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is well suited to cultivated crops, pasture, and hay and to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Terraces, crop rotation, contour farming, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

This soil is well suited to use as a site for dwellings, but erosion is a hazard during construction. Removing the plant cover only from those sites under active construction helps to control erosion and sedimentation. Topsoil can be stockpiled and later returned to the site. Seeding or sodding disturbed areas as soon as possible helps to control erosion. Establishing developments on the contour reduces construction problems and helps to control erosion.

This soil has few limitations if used for septic tank absorption fields. Installing the absorption fields on the contour helps to prevent surfacing of the effluent and contamination of surface water.

The land capability classification is IIIe.

75D—Drury silt loam, 10 to 18 percent slopes. This is a strongly sloping, well drained soil on foot slopes. The areas are irregular in shape and range from 10 to 40 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is friable silt loam about 35 inches thick. In the upper part it is dark brown, and in the lower part it is dark yellowish brown. The underlying material to a depth of 60 inches or more is dark yellowish brown silt loam. In some places reaction in the subsoil is higher. In other places the soil has limestone flagstones throughout.

Included with this soil in mapping are areas where bedrock is within 40 inches of the surface and some areas where bedrock crops out near the base of slopes. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Drury soil at a moderate rate. In cultivated areas surface runoff is rapid.

Available water capacity is high. Organic matter content is moderate. Reaction is medium acid to neutral. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is moderately suited to cultivated crops and well suited to pasture and hay. It is moderately suited to use as a site for septic tank absorption fields and dwellings.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Terraces, a crop rotation that includes grasses or legumes, contour farming, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion and increase water infiltration.

If this soil is used for pasture, overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The slope is a moderate limitation affecting the use of this soil as a site for dwellings. Designing buildings so that they conform to the natural slope of the land helps to overcome the slope. In some areas land shaping by cutting and filling is needed. Erosion is a hazard during construction. Removing the plant cover only from those sites under active construction helps to control erosion sedimentation. Topsoil can be stockpiled and returned to the site after construction. Seeding or sodding all disturbed areas as soon as possible helps to control erosion. Establishing developments on the contour reduces construction problems and helps to control erosion.

The slope is a moderate limitation affecting the use of this soil as a site for septic tank absorption fields. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes.

The land capability classification is IIIe.

75F—Drury silt loam, 18 to 30 percent slopes. This is a steep, well drained soil on foot slopes. The areas are irregular in shape and range from 10 to 30 acres.

Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsoil is friable silt loam about 30 inches thick. In the upper part it is dark brown and dark yellowish brown. In the lower part it is yellowish brown. The underlying material to a depth of 60 inches or more is brown silt loam. In some places the subsoil has more sand. In other places it is calcareous. In some areas the soil has limestone flagstones throughout.

Included with this soil in mapping are areas where bedrock is within a depth of 60 inches and some areas where bedrock crops out near the base of slopes. Also included are areas that have deep gullies. The included areas make up 10 to 15 percent of the map unit.

Water and air move through this Drury soil at a moderate rate. Surface runoff is very rapid. Available water capacity is high. Organic matter content is moderate. Reaction is medium acid to neutral. The potential for frost action is high.

In most areas this soil is used for pasture or woodland. It is moderately suited to pasture and poorly suited to hay. It is well suited to use as woodland and as habitat for woodland wildlife. It is generally not suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields because of the slope and the erosion hazard.

If this soil is used for pasture, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till planter helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and weed control help to maintain the pasture. In some areas stabilizing or rerouting livestock paths helps to prevent the formation of gullies. Steep slopes limit the use of haying equipment.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because of the slope. Another management concern is plant competition, which affects seedlings of desirable species. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or to a grass-legume mixture after the completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Chemical or mechanical measures can reduce the competition from undesirable vegetation in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire protection prevents damage to trees and maintains the leaf mulch.

This soil has good potential for use as habitat for woodland wildlife and fair potential for use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the steep slopes and low fertility limit the extent of grain and seed crops. Areas of native hardwoods provide good habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is VIe.

78—Arenzville silt loam. This is a nearly level, well drained soil on alluvial fans. It is protected by a levee system, but is subject to rare flooding. The areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is dark brown, friable silt loam about 10 inches thick. The underlying material is about 50 inches thick. In the upper part it is dark brown, friable silt loam. In the lower part, 27 inches below the surface, it is a buried soil that is very dark gray and dark brown, friable silt loam. In places the buried soil is at a depth of less than 20 or more than 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Dupo and Wakeland soils in the lower positions on the landscape. Dupo soils have buried soil layers that are higher in clay content than those in the Arenzville soil. Wakeland soils generally do not have buried soil layers.

Water and air move through the Arenzville soil at a moderate rate. In cultivated areas surface runoff is slow. Available water capacity is high. Organic matter content is moderately low. Reaction is medium acid to mildly alkaline. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because flooding is a hazard.

This soil is well suited to corn, soybeans, and small grain. Conservation tillage and crop residue management help to maintain soil fertility and soil tilth. A levee protects the soil from flooding by the river. The soil is subject to rare flooding for very brief periods, however, because of surface runoff trapped behind the levee.

This soil is suited to pasture and hay. Overgrazing reduces forage yields and causes surface compaction. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture.

The land capability classification is I.

84—Okaw silt loam. This is a nearly level, poorly drained soil on terraces along the major streams. It is subject to occasional flooding and ponding for brief periods in spring. The areas are irregular in shape and range from 20 to 100 acres.

Typically, the surface layer is brown, mottled, friable silt loam about 10 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 7 inches thick. The subsoil is about 43 inches thick. It is grayish brown and mottled. In the upper part it is friable silty clay loam. In the lower part it is firm silty clay. In places the subsoil has less clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Hurst and Wakeland soils in the higher landscape positions. Wakeland soils formed entirely in silty sediments. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Okaw soil at a very slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below in spring. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil ranges from medium acid to very strongly acid. After hard rains, a crust commonly forms on the surface. The soil dries slowly in spring. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops, hay, or pasture. It is poorly suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because flooding is a hazard.

If this soil is used for corn or soybeans, the seasonal high water table and spring flooding delay planting. The soil dries slowly in spring. Surface ditches remove excess water. Low reaction in the subsoil restricts root growth and the availability of plant nutrients. Crops respond well to fertilization if this soil is adequately limed. Keeping tillage operations to a minimum and returning crop residue to the soil help to improve soil tilth and soil fertility, reduce crusting, and increase water infiltration. In some years the amount of available soil moisture is inadequate for optimum corn yields because of the high clay content. Grain sorghum and soybean yields are less affected by the reduced amount of available water.

If adequately limed, this soil is suited to pasture and hay. Installing surface ditches to remove excess water helps to reduce winterkill and frost heave. Water-tolerant grasses and legumes are suitable for planting. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and poor soil tilth.

The land capability classification is IVw.

96F—Eden flaggy silt loam, 20 to 30 percent slopes. This is a moderately deep, steep, well drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 400 acres.

Typically, the surface layer is very dark grayish brown flaggy silt loam about 3 inches thick. The subsoil is about 21 inches thick. In the upper part it is dark yellowish brown, friable flaggy silty clay loam. In the next part it is strong brown, firm flaggy and very flaggy silty clay. In the lower part it is strong brown, very firm extremely flaggy silty clay. Limestone bedrock is at a depth of about 24 inches. In some places the subsoil is thicker. In other places fewer stones are throughout the profile. In some areas the upper part of the subsoil formed in a paleosol.

Included with this soil in mapping are small areas of exposed bedrock and vertical bedrock escarpments (fig. 8). Also included are areas of soils that are shallow to bedrock. The included areas make up 5 to 15 percent of the map unit.

Water and air move through this Eden soil at a slow rate. Surface runoff is rapid. Available water capacity is low. Organic matter content is moderately low. Reaction in the subsoil is slightly acid to moderately alkaline. The

Figure 8.—Limestone outcrops included in an area of Eden flaggy silt loam, 20 to 30 percent slopes.

shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used as native woodland and as habitat for wildlife. It is moderately suited to use as woodland. It is not suited to cultivated crops, pasture, and hay or to use as a site for dwellings and septic tank absorption fields because of the steep slopes and limestone outcrops.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because

of the slope. Other management concerns are the windthrow hazard and seedling mortality, which is caused by the low available water capacity. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. Seeding all bare areas created by logging operations to a grass-legume mixture after the completion of logging operations also helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Planting stock that is larger than typical helps to reduce seedling mortality. Using harvesting methods that do not leave isolated or widely spaced trees and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland reduce the windthrow hazard. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire protection prevents damage to trees and maintains the leaf mulch.

Areas of this soil that support native hardwoods have fair or good potential as habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is VIIe.

122B—Colp silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on terraces and terrace breaks. The areas are irregular in shape and range from 20 to 100 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, friable silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part it is yellowish brown, mottled, firm and very firm silty clay and clay. In the next part it is brown, mottled, firm silty clay loam. In the lower part it is light brownish gray, mottled, friable and firm silty clay loam and silty clay. In places the subsoil has less clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Hurst soils. These soils are in the lower landscape positions and are subject to occasional flooding. They make up 5 to 10 percent of the map unit.

Water and air move through this Colp soil at a slow rate. Surface runoff is slow. The seasonal water table is 2 to 4 feet below the surface in spring. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to medium acid. After hard rains, a crust commonly forms on the surface. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and well suited to pasture and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Contour farming and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration. Low reaction in the subsoil restricts the availability of plant nutrients. Adding lime helps to make nutrients more available and increases yields. In some years the amount of available soil moisture is inadequate for optimum corn yields because of the high clay content. Grain sorghum and soybean yields are less affected by the reduced amount of available water.

If adequately limed, this soil is suited to pasture and hay. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth.

The seasonal high water table is a severe limitation affecting the use of this soil as a site for dwellings with basements and a moderate limitation on sites for dwellings without basements. The shrink-swell potential is a severe limitation on sites for dwellings without basements. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Revegetation is difficult if the subsoil is exposed.

The slow permeability and the seasonal high water table are severe limitations affecting the use of this soil as a site for septic tank absorption fields. Replacing the soil with more permeable material helps to overcome the slow permeability. Subsurface drains help to lower the seasonal high water table.

The land capability classification is IIIe.

122C3—Colp silty clay loam, 5 to 12 percent slopes, severely eroded. This is a sloping, moderately well drained soil on terraces and terrace breaks. The areas are elongated and range from 10 to 40 acres.

Typically, the surface layer is brown, friable silty clay loam about 9 inches thick. The subsoil is about 51 inches thick. In the upper part it is dark yellowish brown, very firm clay. In the next part it is yellowish brown and brown, mottled, very firm clay. In the lower part it is brown and grayish brown, mottled, firm silty clay. In some places the subsoil has less clay. In other places it has small pebbles throughout.

Included with this soil in mapping are small areas of the somewhat poorly drained Blair and Hurst soils. Blair soils formed in silty sediments and are moderately slowly permeable. They are in positions on the landscape similar to those of the Colp soil. Hurst soils are in the less sloping areas. The included soils make up 10 to 15 percent of the map unit.

Water and air move through this Colp soil at a slow rate. In cultivated areas surface runoff is medium. The seasonal water table is 2 to 4 feet below the surface in spring. Available water capacity is moderate. Organic

matter content is low. Reaction in the subsoil is very strongly acid to medium acid. After hard rains, a crust commonly forms on the surface. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is poorly suited to cultivated crops and well suited to pasture and hay. It is poorly suited to use as a site for septic tank absorption fields and dwellings.

If this soil is used for corn, soybeans, or small grain, erosion is a severe hazard. Terraces, crop rotation, contour farming, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration. Low reaction in the subsoil restricts the availability of plant nutrients. Adding lime helps to make nutrients more available and increases yields. In some areas the amount of available soil moisture is inadequate for optimum corn yields because of the high clay content. Grain sorghum and soybean yields are less affected by the reduced amount of available water.

This soil is suited to pasture and hay. Erosion is a hazard, particularly during the establishment period. Seeding on the contour and applying lime and fertilizer help to control erosion and establish the pasture. Overgrazing causes a reduced forage yield, surface compaction, excessive runoff, and erosion. Hay and pasture planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table is a severe limitation affecting the use of this soil as a site for dwellings with basements and a moderate limitation on sites for dwellings without basements. The shrink-swell potential is a severe limitation on sites for dwellings without basements. The slope is a moderate limitation on sites for both kinds of dwellings. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Land shaping by cutting and filling is needed to prepare building sites. Revegetation is difficult if the subsoil is exposed.

The slow permeability and the seasonal high water table are limitations affecting the use of this soil as a site for septic tank absorption fields. Replacing the soil with more permeable material helps to overcome the slow permeability. Subsurface drains help to lower the water table. Placing the filter lines on the contour helps to prevent seepage of effluent on side slopes and contamination of surface water.

The land capability classification is IVe.

123—Riverwash. This map unit is between the Corps of Engineers levee and the Mississippi River. It is subject to frequent flooding or ponding for long periods. The areas are linear in shape and range from 10 to 400 acres.

Typically, the areas consist of stratified sandy material. Slopes are irregular, and there are many short escarpments where flowing water has cut away some sand.

Water and air generally move through this sandy material at a rapid rate. The water table is several feet above the surface during periods of flooding. It is within a depth of 3 feet during other periods. The depth of the water table is largely controlled by the water level of the river. Available water capacity is low. Organic matter content is very low.

Most areas are idle land and support very little vegetation. Areas of Riverwash are generally not suited to crops or use as woodland or as a site for dwellings and septic tank absorption fields because of flooding. These areas are a probable source of sand.

A land capability classification has not been assigned.

180—Dupo silt loam. This is a nearly level, somewhat poorly drained soil on flood plains adjacent to bluffs. It is protected by a levee but is subject to rare flooding. The areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface soil is dark brown, friable silt loam about 16 inches thick. The underlying material is dark brown, mottled, friable silt loam about 18 inches thick. Below this is a buried soil of very dark gray, mottled, firm silty clay. In places the layer of silty clay is deeper.

Included with this soil in mapping are small areas of the well drained Arenzville, poorly drained Fults, and moderately well drained Wilbur soils. Arenzville soils are underlain by a silt loam buried soil. Fults soils are in the lower landscape positions. They have more clay in the surface layer than the Dupo soil. Wilbur soils formed entirely in silty sediments and are in the higher landscape positions. The included areas make up 5 to 10 percent of the map unit.

Water and air move through the upper part of this Dupo soil at a moderate rate and through the lower part at a slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction is neutral throughout the profile. The potential for frost action is high. The shrink-swell potential is low in the surface layer and the underlying material and high in the buried soil layer.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some

years. The levee protects the soil from flooding by the river, but the soil is subject to rare flooding for very brief periods because of surface runoff trapped behind the levee. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture and hay, water-tolerant grasses and legumes are suitable. Removing excess water with surface ditches reduces winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIw.

226—Wirt silt loam. This is a nearly level, well drained soil on narrow bottom lands. It is subject to occasional flooding for brief periods in spring. The areas are linear in shape and range from 3 to 20 acres.

Typically, the surface layer is dark brown, friable silt loam about 3 inches thick. The subsoil is about 30 inches thick. In the upper part it is dark brown, friable silt loam. In the lower part it is dark yellowish brown and yellowish brown, mottled, friable loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled sandy loam and gravelly and very gravelly sandy loam. In some places the soil has coarse fragments within 20 inches of the surface. In other places it does not have coarse fragments within a depth of 60 inches. In some areas bedrock is within a depth of 60 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland soils. These soils are in landscape positions similar to those of the Wirt soil. They do not have coarse fragments within a depth of 60 inches. They make up 5 to 10 percent of the map unit.

Water and air move through this Wirt soil at a moderate rate. Surface runoff is slow. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is medium acid to neutral. The shrink-swell potential is low, and the potential for frost action is moderate.

In most areas this soil is used for woodland or pasture. Most areas are not easily accessible and commonly are not wide enough for easy cultivation. The soil is well suited to pasture and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

In the areas used for pasture, overgrazing reduces forage yields and causes surface compaction. Pasture and hayland planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture.

In the wooded areas, measures that exclude livestock and prevent fires are needed. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection helps to prevent damage to trees and helps to maintain the leaf mulch.

This soil is well suited to use as habitat for openland and woodland wildlife. It is suited to grain and seed crops, grasses, wild herbaceous plants, and hardwood species. Trees and shrubs are easily established, and native stands of trees provide good habitat for woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is IIw.

249—Edinburg silt loam. This is a nearly level, poorly drained soil in upland depressions and drainageways. It is ponded for brief periods in spring. The areas are irregular in shape and range from 10 to 50 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is very dark grayish brown, friable silty clay loam about 11 inches thick. The subsoil is about 41 inches thick. In the upper part it is gray and grayish brown, mottled, firm silty clay. In the next part it is light brownish gray, mottled, friable silty clay loam. In the lower part it is light brownish gray, mottled, friable silt loam. In some places the surface layer has more clay. In other places it has less organic matter and is lighter in color.

Water and air move through this Edinburg soil at a slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is high. Organic matter content is moderate. Reaction in the subsoil is medium acid to neutral. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of ponding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table and ponding delay planting in some years. Surface ditches and subsurface drains help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture and hay, frost heave commonly damages the plants. Surface ditches and subsurface drains help to remove excess water. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIw.

274G—Seaton silt loam, 30 to 60 percent slopes. This is a very steep, well drained soil on dissected upland side slopes. The areas are irregular in shape and range from 20 to 2,000 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 1 inch thick. The subsurface layer is dark grayish brown and brown, friable silt loam about 5 inches thick. The subsoil is dark brown, friable silt loam about 54 inches thick. In some areas the subsoil has more clay. In other areas the subsoil and the underlying material are calcareous. Some areas are less sloping.

Included with this soil in mapping are small areas of Eden and Lacrescent soils. Eden soils formed in loess and material weathered from limestone. They are near the base of slopes. Lacrescent soils formed in colluvium and are on the face of bluffs. Also included are areas of limestone outcrops at midslope and near the base of slopes. The included areas make up 5 to 15 percent of the map unit.

Water and air move through this Seaton soil at a moderate rate. Surface runoff is very rapid. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to neutral. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil supports native hardwood trees (fig. 9). It is well suited to woodland and to habitat for woodland wildlife. It is generally not suited to cultivated crops, pasture, and hay and to use as a site for dwellings and septic tank absorption fields because of the slope and the limestone outcrops.

Because of the slope, the main concerns in managing woodland are the erosion hazard and the equipment limitation. Another management concern is plant competition, which affects seedlings of desirable species. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or a grass-legume mixture after completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Chemical or mechanical measures can reduce competition from undesirable vegetation in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

The areas of native hardwoods have good potential for use as habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is VIIe.

284—Tice silty clay loam. This is a nearly level, somewhat poorly drained soil on slight rises and low terraces on flood plains. It is protected by a levee system but is subject to rare flooding. The areas are irregular in shape and range from 15 to 80 acres.

Typically, the surface layer is very dark gray, friable silty clay loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silty clay loam about 6 inches thick. The subsoil is friable silty clay loam about 45 inches thick. In the upper part it is dark grayish brown. In the lower part it is grayish brown and mottled. In places the subsoil and the underlying material have more sand. In some areas the subsoil has more clay.

Included with this soil in mapping are small areas of the poorly drained Beaucoup and Fults soils in the lower positions on the landscape. Fults soils have more clay in the subsoil and more sand in the lower part than the Tice soil. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Tice soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.0 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Reaction in the subsoil is medium acid to neutral. The surface layer is easily tilled only within a narrow range in moisture content. It becomes hard and cloddy if tilled when wet. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. The levee protects the soil from flooding by the river, but the soil is subject to rare flooding because of surface runoff trapped behind the levee. Surface ditches help to remove excess water. Subsurface drains can be used if suitable outlets are available. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility and increase water infiltration.

If this soil is used for pasture and hay, frost heave commonly damages the plants. Surface ditches help to remove excess water. Subsurface drains can be used if suitable outlets are available. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is I.

302—Ambraw silty clay loam. This is a nearly level, poorly drained soil in swales and on broad, low ridges on flood plains. It is protected by a levee system but is subject to rare flooding. The areas are irregular in shape and range from 5 to 150 acres.

Typically, the surface layer is very dark gray, friable silty clay loam about 11 inches thick. The subsoil is

Figure 9.—A wooded area of Seaton silt loam, 30 to 60 percent slopes. Hamburg silt loam, 20 to 30 percent slopes, is in the foreground.

about 31 inches thick. In the upper part it is dark gray, mottled, friable clay loam and sandy clay loam. In the next part it is gray, mottled, friable clay loam and very friable sandy clay loam. In the lower part it is dark grayish brown, mottled, very friable sandy loam. The underlying material to a depth of 60 inches or more is gray, friable loam and silt loam. In some places the subsoil has more sand. In other places it has more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Riley and Nameoki soils in the higher landscape positions. Nameoki soils have more clay in the subsoil than the Ambraw soil. The included areas make up 2 to 10 percent of the map unit.

Water and air move through this Ambraw soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is within a depth of 2 feet in spring. Available water capacity is high. Organic matter

content is moderate. Reaction in the subsoil is strongly acid to neutral. After hard rains, a crust commonly forms on the surface. The soil is easily tilled only within a narrow range in moisture content. It becomes hard and cloddy if tilled when too wet. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. The levee protects the soil from frequent flooding by the river, but the soil is subject to rare flooding because of surface runoff trapped behind the levee. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil improve soil tilth and soil fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture and hay, the seasonal high water table reduces yields. Water-tolerant grasses and legumes are suitable. Removing excess water with surface ditches helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIw.

304B—Landes very fine sandy loam, 1 to 7 percent slopes. This is a gently sloping, well drained soil on undulating ridges and natural levees on flood plains along the major rivers and streams. It is protected by a levee system but is subject to rare flooding. The areas are irregular in shape and range from 10 to 250 acres.

Typically, the surface soil is very dark gray, very friable very fine sandy loam about 14 inches thick. The subsoil is dark brown and brown, very friable very fine sandy loam about 25 inches thick. The underlying material to a depth of 60 inches or more is dark yellowish brown, loose loamy very fine sand. In some places the soil has more silt and clay throughout. In other places the underlying material has more clay. In some areas the soil has more sand throughout.

Included with this soil in mapping are small areas of the somewhat poorly drained Riley and Nameoki soils in depressions and along drainageways. Riley soils have less sand throughout than the Landes soil, and Nameoki soils have more clay in the upper part. The included soils make up 2 to 5 percent of the map unit.

Water and air move through the upper part of this Landes soil at a moderately rapid rate and through the lower part at a rapid rate. In cultivated areas surface runoff is slow. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is slightly acid to mildly alkaline. The shrink-swell potential is low. The potential for frost action is moderate.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and well suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, water erosion and soil blowing are hazards and the moderate available water capacity is a limitation. Contour farming and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion and soil blowing. Selecting crops and crop species that are drought tolerant or that mature before the hot, dry part of summer helps to overcome the moderate available water capacity. Leaving crop residue on the surface also helps to conserve soil moisture. The soil is suited to irrigation, and a source of water is generally available.

If this soil is used for pasture and hay, yields are reduced during periods of low rainfall. Water can be added by irrigation systems. Soil blowing is a hazard. It can be controlled by field windbreaks. Water erosion is a hazard, particularly during the establishment period. Seeding on the contour and applying lime and fertilizer help to ensure good growth of pasture plants and control erosion. Allowing sufficient time for pasture plants to become established and preventing overgrazing help to maintain the pasture.

The land capability classification is IIe.

308B—Alford silt loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on upland ridges (fig. 10). The areas are irregular in shape and range from 5 to 200 acres.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 41 inches thick. In the upper part it is dark brown, friable silt loam. In the next part it is dark brown, friable silty clay loam. In the lower part it is dark brown, friable silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, friable silt loam. In some areas the subsoil has continuous silt coatings in the middle part and is firm and brittle in the lower part. In other areas the upper part of the subsoil is mottled.

Included with this soil in mapping are small areas of the somewhat poorly drained Marine soils in drainageways, in depressions, and on side slopes at the head of drainageways. These soils are moderately slowly permeable. They make up 2 to 5 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is strongly acid to slightly acid. The shrink-swell potential is moderate. The potential for frost action is high.

Figure 10.—An area of Alford silt loam, 2 to 5 percent slopes, on a narrow ridge. Seaton silt loam, 30 to 60 percent slopes, is on the steeper adjacent side slopes.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings and well suited to use as a site for septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by contour farming and a conservation tillage system that leaves crop residue on the surface after planting.

If this soil is used for pasture, overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The shrink-swell potential is a limitation affecting the use of this soil as a site for dwellings. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling.

The land capability classification is IIe.

308C2—Alford silt loam, 5 to 10 percent slopes, eroded. This is a sloping, well drained soil on upland side slopes and ridges. The areas are irregular in shape and range from 5 to 30 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 52 inches thick. In the upper part it is yellowish brown, friable silty clay loam. In the lower part it is yellowish brown, friable silt loam. In places the surface layer is thinner. In some areas the subsoil has continuous silt coatings in the lower part and is firm and brittle in the middle part. In other areas the subsoil is mottled.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland soils on narrow bottom lands. The included areas make up 2 to 5 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is low. Reaction is strongly acid or medium acid

in the subsoil. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, and hay. It is moderately suited to cultivated crops and well suited to pasture and hay. It is well suited to use as a site for septic tank absorption fields and moderately suited to use as a site for dwellings.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Terraces, crop rotation, contour farming, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration (fig. 11).

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The shrink-swell potential is a limitation affecting the use of this soil as a site for dwellings. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Erosion is a hazard during construction. Removing the plant cover only from those sites under active construction helps to control erosion and sedimentation. Topsoil can be stockpiled and later returned to the site. Seeding or sodding all disturbed areas as soon as possible helps to control erosion. Laying out developments on the contour reduces construction problems and the hazard of erosion.

The land capability classification is IIIe.

Figure 11.—A terrace in an area of Alford silt loam, 5 to 10 percent slopes, eroded.

308D3—Alford silt loam, 10 to 15 percent slopes, severely eroded. This is a strongly sloping, well drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 25 acres.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 54 inches of yellowish brown, friable silty clay loam and silt loam. In some places the surface layer has more clay. In other places the soil has more sand and pebbles throughout. In some areas the subsoil is firm and brittle in the lower part.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland soils in narrow drainageways. The included areas make up 2 to 5 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. In cultivated areas surface runoff is rapid. Available water capacity is high. Organic matter content is low. Reaction in the subsoil is very strongly acid to medium acid. After hard rains, a crust commonly forms on the surface. The soil is easily tilled only within a narrow range in moisture content. It becomes hard and cloddy if tilled when wet. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, and hay. It is poorly suited to cultivated crops and well suited to pasture and hay. It is moderately suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Resource management systems that include crop rotations with 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these practices help to control erosion and improve soil tilth.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The shrink-swell potential and the slope are limitations affecting the use of this soil as a site for dwellings. Erosion is a hazard during construction periods. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Land shaping by cutting and filling is needed. Removing the plant cover only from those sites under active construction helps to control erosion and sedimentation. Topsoil can be stockpiled and later returned to the site. Seeding or sodding all disturbed areas as soon as possible helps to control erosion. Laying out developments on the contour reduces construction problems and helps to control erosion.

The slope is a limitation affecting the use of this soil as a site for septic tank absorption fields. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes.

The land capability classification is IVe.

308E3—Alford silt loam, 15 to 30 percent slopes, severely eroded. This is a moderately steep, well drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 20 acres.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsoil is friable silt loam about 52 inches thick. It is strong brown in the upper part and dark brown in the lower part. In places the soil has more sand and pebbles throughout.

Included with this soil in mapping are small areas of the slowly permeable Ursa soils, which formed in a paleosol in the lower positions on the slopes. Also included are bedrock outcrops at the base of some slopes. The included areas make up 2 to 5 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is low. Reaction in the subsoil is strongly acid or medium acid. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for pasture, hay, or woodland. It is generally not suited to cultivated crops because of the slope and the erosion hazard. It is well suited to pasture and hay and to use as woodland and as habitat for woodland wildlife. It is moderately suited to use as habitat for openland wildlife. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for pasture and hay, erosion is a hazard during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, weed control, additions of fertilizer, and restricted use during wet periods help to maintain the pasture.

The main concerns in managing woodland are excluding livestock and preventing fires. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

This soil has good potential for use as habitat for woodland wildlife and fair potential for use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the moderately steep slopes and low fertility limit the extent of grain and seed crops. Protection from fire and grazing is essential.

The slope and the shrink-swell potential are limitations affecting the use of this soil as a site for dwellings. Extensive land shaping by cutting and filling is needed to prepare building sites. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Leaving as much vegetation on the surface as possible during construction helps to control erosion. Seeding or sodding disturbed areas as soon as possible helps to control erosion.

The slope is a severe limitation affecting the use of this soil as a site for septic tank absorption fields. Placing the filter lines on the contour helps to prevent contamination of surface water and seepage of effluent on side slopes.

The land capability classification is VIe.

308F—Alford silt loam, 20 to 35 percent slopes. This is a steep, well drained soil on dissected upland side slopes. The areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 52 inches of yellowish brown, friable silty clay loam and silt loam. The underlying material is brown, friable silt loam. In some areas the soil has more sand and pebbles throughout.

Included with this soil in mapping are small areas of the slowly permeable Ursa soils, which formed in a paleosol. These soils are in landscape positions similar to those of the Alford soil. Also included are some areas of rock outcrops at the base of slopes and areas where deep gullies have been cut into many of the side slopes. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. Surface runoff is very rapid. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is strongly acid or medium acid. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil supports native hardwoods. It is moderately suited to use as woodland and well suited to use as habitat for woodland wildlife. It is moderately suited to pasture. It is generally not suited to cultivated crops and hay and to use as a site for dwellings and septic tank absorption fields because of the slope.

Because of the slope, the main concerns in managing woodland are the erosion hazard and the equipment limitation. Another management concern is plant competition, which affects seedlings of desirable species. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or a grass-legume mixture after completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

This soil has good potential for use as habitat for woodland wildlife. Adequate stands of herbaceous cover can be maintained, but the steep slopes and low fertility limit the extent of grain and seed crops. Areas of native hardwoods have good potential for use as habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is VIe.

333—Wakeland silt loam. This is a nearly level, somewhat poorly drained soil on the flood plains in upland drainageways and on alluvial fans. It is subject to occasional flooding for brief periods in spring. The areas are irregular in shape and range from 5 to 20 acres.

Typically, the surface layer is dark grayish brown, mottled, friable silt loam about 9 inches thick. The underlying material to a depth of 60 inches or more is grayish brown and light brownish gray, mottled, friable silt loam. In some places the root zone is more acid. In other places the underlying material has more sand and limestone flagstones. In some areas a buried soil is at a depth of less than 40 inches.

Included with this soil in mapping are small areas of the poorly drained Birds and moderately well drained Wilbur soils. Birds soils are in the lower areas and are subject to frequent flooding for long periods in spring. Wilbur soils are in the higher areas. The included areas make up 2 to 10 percent of the map unit.

Water and air move through this Wakeland soil at a moderate rate. In cultivated areas surface runoff is very slow. The seasonal high water table is 1 foot to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction is medium acid to neutral. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table and occasional flooding delay planting in some years. Surface ditches help to remove excess water. Subsurface drains can be used if

suitable outlets are available. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility.

If this soil is used for pasture and hay, water-tolerant legumes and grasses are suitable. Removing excess water with surface ditches and subsurface drains helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

This soil is well suited to use as habitat for openland and woodland wildlife. It is suited to grain and seed crops, grasses, wild herbaceous plants, and hardwood species. When flooded, it provides temporary feeding and resting sites for migratory and resident waterfowl. Protection from fire and grazing is essential.

The land capability classification is IIw.

334—Birds silt loam. This is a nearly level, poorly drained soil on flood plains along the major streams. It is subject to ponding and to frequent flooding for long periods in spring. The areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface soil is dark grayish brown, mottled, friable silt loam about 18 inches thick. The underlying material to a depth of 60 inches or more is gray, mottled silt loam and silty clay loam. In some places the root zone is more acid. In other places the lower part of the soil has more clay.

Included with this soil in mapping are small areas of the poorly drained Okaw and somewhat poorly drained Wakeland soils. Okaw soils formed in clayey lacustrine sediments and are on the slightly higher terraces. Wakeland soils are in the slightly higher positions on flood plains. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Birds soil at a moderately slow rate. In cultivated areas surface runoff is very slow or ponded. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below in spring. Available water capacity is high. Organic matter content is moderately low. Reaction is strongly acid to neutral. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is undrained and supports native hardwoods. It is generally not suited to cultivated crops, pasture, and hay because of flooding. It is well suited to use as woodland. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

Because of the seasonal high water table, the main concerns in managing woodland are the equipment limitation, seedling mortality, and windthrow. Another management concern is plant competition, which affects seedlings of desirable species. Limiting the use of equipment to periods when the soil is firm reduces the equipment limitation. Planting stock that is larger than is typical helps to reduce seedling mortality. Planting on ridges helps to overcome excessive moisture conditions. Using harvesting methods that do not leave isolated or widely spaced trees and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to reduce windthrow. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

This soil is well suited to use as habitat for openland, woodland, and wetland wildlife. It is suited to grain and seed crops, grasses, wild herbaceous plants, and hardwood species. Shallow water areas for waterfowl can be easily developed. Protection from fire and grazing is essential.

The land capability classification is Vw.

336—Wilbur silt loam. This is a nearly level, moderately well drained soil on the flood plains along the major streams and upland drainageways and on alluvial fans (fig. 12). The soil is subject to rare flooding. The areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The underlying material to a depth of 60 inches or more is friable silt loam. In the upper part it is brown. In the lower part it is brown and dark yellowish brown and is mottled. In places a dark buried soil is within 40 inches of the surface. In some areas the soil has limestone flagstones throughout. In other areas it has more sand throughout.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland soils. These soils are in the lower landscape positions and are occasionally flooded. They make up 5 to 10 percent of the map unit.

Water and air move through this Wilbur soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.0 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction is medium acid to neutral throughout the profile. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is well suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

In areas used for corn, soybeans, or small grain, keeping tillage operations to a minimum and returning

Figure 12.—An area of Wilbur silt loam in the foreground. Drury soils are on the sloping terraces below the tree line.

crop residue to the soil help to maintain soil tilth and soil fertility.

If this soil is used for pasture and hay, water-tolerant legumes and grasses are suitable. Frost heave is a problem in undrained areas. Excess water can be removed by surface ditches and subsurface drains. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is I.

338B—Hurst silt loam, 1 to 7 percent slopes. This is a gently sloping, somewhat poorly drained soil on terraces along the major streams. It is subject to rare flooding. The areas are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsurface layer is brown and pale brown, friable silt loam about 7 inches thick. The subsoil is about 44 inches thick. In the upper part it is brown, friable silty clay loam. In the lower part it is grayish brown, mottled, firm silty clay. In places the surface layer is thinner and has more clay.

Included with this soil in mapping are small areas of the moderately well drained Colp and poorly drained Okaw soils. Colp soils are on the short, steep sides of terraces and in the higher terrace positions. Okaw soils are in the lower positions. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Hurst soil at a very slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 1 foot to 3 feet below the surface in spring. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is strongly acid or very strongly acid. After hard rains, a crust commonly forms on the surface. The soil dries slowly in spring. The shrink-swell potential is high, and the potential for frost action is moderate.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Contour farming and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, improve soil tilth, and increase water infiltration. Low reaction in the subsoil restricts the availability of plant

nutrients. Crops respond well to fertilization if the soil is adequately limed. Surface ditches help to lower the seasonal high water table. In some years the soil does not supply enough moisture for optimum corn yields because of the high clay content in the subsoil. Grain sorghum and soybean yields are less affected by the reduced amount of available water.

This soil is suited to pasture and hay. Water-tolerant grasses and legumes are suitable. Erosion is a hazard, particularly during the establishment period. Seeding on the contour and applying lime and fertilizer help to establish the pasture and control erosion. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth. Removing excess water with surface ditches helps to reduce winterkill and frost heave.

The land capability classification is IIIe.

394B—Haynie silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on undulating ridges on flood plains. It is subject to rare flooding. The areas are irregular in shape and range from 10 to 250 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The underlying material to a depth of 60 inches or more is stratified dark grayish brown, brown, very dark grayish brown, and dark gray, mottled, friable silt loam and silty clay loam. In places the soil has more sand throughout.

Included with this soil in mapping are small areas of the poorly drained Ambraw soils in depressions. These soils have more clay than the Haynie soil. Also included are some areas along old channels where slopes are short and steep. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Haynie soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction is mildly alkaline or moderately alkaline throughout the profile. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. A conservation tillage system that leaves crop residue on the surface after planting helps to control erosion, helps to maintain soil tilth, and increases water infiltration.

This soil is suited to pasture and hay. Erosion is a hazard, particularly during the establishment period. Seeding on the contour helps to control erosion. Allowing sufficient time for pasture plants to become established before they are grazed and preventing overgrazing help to maintain the pasture.

The land capability classification is IIe.

408—Aquents, loamy. These nearly level, very poorly drained soils are in depressions, abandoned channels, and low areas on flood plains. They are subject to ponding and frequent flooding for very long periods in spring. The areas are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer is very dark gray, firm silty clay loam about 6 inches thick. The subsurface layer is very dark gray, firm silty clay about 5 inches thick. The underlying material to a depth of 60 inches or more is stratified silty clay loam, silty clay, silt loam, and very fine sandy loam. In some places the soil has more clay throughout. In other places it has more sand throughout.

Water and air generally move through these soils at a moderately slow rate. Surface runoff is very slow or ponded. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below during most of the year. Ponding generally occurs at some time during the growing season. Available water capacity is high. Organic matter content is moderate. Reaction is neutral or mildly alkaline throughout the profile.

In most areas these soils support native trees and herbaceous plants. Some areas have been cleared. The soils are generally not suited to cultivated crops, pasture, and hay and to use as a site for dwellings and septic tank absorption fields because of flooding. They are well suited to wetland plants and to use as habitat for wetland wildlife.

The wetland plant species on these soils provide good food and cover for wetland wildlife, such as ducks, muskrat, mink, and shore birds. Shallow water areas can be easily developed. Protection from fire and grazing is essential.

A land capability classification has not been assigned.

430—Raddle silt loam. This is a nearly level, well drained soil on foot slopes and low terraces on flood plains. It is subject to rare flooding. The areas are irregular in shape and range from 10 to 60 acres.

Typically, the surface soil is very dark grayish brown, friable silt loam about 19 inches thick. The subsoil is dark brown and very dark grayish brown, friable silt loam about 41 inches thick. It is mottled in the lower part. In places the subsoil has more sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Tice soils in the slightly lower positions on the landscape. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Raddle soil at a moderate rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter

content is moderate. Reaction is medium acid to neutral. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

In areas used for corn, soybeans, and small grain, keeping tillage at a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility.

The land capability classification is I.

452A—Riley loam, 0 to 3 percent slopes. This is a nearly level, somewhat poorly drained soil on low terraces on flood plains. It is protected by a levee system but is subject to rare flooding. The areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is very dark gray, friable loam about 11 inches thick. The subsoil is about 22 inches thick. It is dark yellowish brown and dark grayish brown and is mottled. In the upper part it is friable clay loam, in the next part it is friable sandy clay loam, and in the lower part it is very friable sandy loam. The underlying material to a depth of 60 inches or more is brown, mottled, loose loamy sand. In some places the subsoil is thicker. In other places the subsoil and the underlying material have more clay. In some areas the subsoil has more sand.

Included with this soil in mapping are small areas of the poorly drained Fults and well drained Landes soils. Fults soils have more clay in the upper part than the Riley soil. They are in depressions and the lower lying areas. Landes soils have more sand throughout than the Riley soil. They are on ridges and the higher terraces. The included areas make up 5 to 15 percent of the map unit.

Water and air move through the upper part of this Riley soil at a moderate rate and through the underlying material at a rapid rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.0 feet below the surface in spring. Available water capacity is moderate. Organic matter content also is moderate. Reaction in the subsoil is medium acid to mildly alkaline. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. Surface ditches help to remove excess water. Subsurface drains can be used if suitable outlets are available. The levee protects this soil from flooding by the river, but the soil is subject to rare flooding because of surface runoff trapped behind the levee. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility and increase water infiltration.

If this soil is used for pasture and hay, the plants commonly are damaged by frost heave. Surface ditches help to remove excess water. Subsurface drains can be used if suitable outlets are available. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is I.

453B—Muren silt loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained soil on upland ridges and side slopes. The areas are irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsurface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 29 inches thick. In the upper part it is yellowish brown, mottled, friable silt loam. In the next part it is dark yellowish brown, mottled, friable silty clay loam. In the lower part it is grayish brown and strong brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is light brownish gray and strong brown, mottled, friable silt loam. In places tillage has mixed the surface layer with the subsoil. In some areas the subsoil has continuous silt coatings in the middle part and is brittle in the lower part. In other areas the subsoil does not have mottles.

Included with this soil in mapping are small areas of the somewhat poorly drained Marine and Wakeland soils. Marine soils are on the less sloping parts of ridges. They have more clay in the subsoil than the Muren soil. Wakeland soils are in narrow drainageways. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Muren soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water table is 2 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is medium acid or strongly acid. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings without basements. It is poorly suited to use as a site for dwellings with basements and for septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Contour farming and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation

grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table is a moderate limitation affecting the use of this soil as a site for dwellings without basements and a severe limitation on sites for dwellings with basements. The shrink-swell potential is a moderate limitation on sites for dwellings with or without basements. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Installing tile drains around the base of foundations helps to lower the seasonal high water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table is a limitation. It can be lowered by subsurface drains.

The land capability classification is IIe.

453C2—Muren silt loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, moderately well drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 30 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is mottled, friable silt loam about 29 inches thick. In the upper part it is yellowish brown. In the lower part it is grayish brown. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In some areas the subsoil has continuous silt coatings in the middle part and is brittle in the lower part.

Water and air move through this Muren soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water table is 2 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is low. Reaction in the subsoil is medium acid or strongly acid. The surface layer tends to crust and puddle after hard rains. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and well suited to pasture and hay. It is moderately suited to use as a site for dwellings without basements and poorly suited to use as a site for dwellings with basements. It is poorly suited to use as a site for septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Terraces, crop rotation, contour farming, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Overgrazing causes reduced forage yields, surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table is a moderate limitation affecting the use of this soil as a site for dwellings without basements and a severe limitation on sites for dwellings with basements. The shrink-swell potential and the slope are moderate limitations on sites for dwellings with or without basements. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Installing tile drains around the base of foundations helps to lower the seasonal high water table. Land shaping by cutting and filling helps to overcome the slope. Removing the plant cover only from those sites under active construction helps to control erosion. Topsoil can be stockpiled and later returned to the site. Seeding or sodding all disturbed areas as soon as possible helps to control erosion.

The slope and the seasonal high water table are limitations affecting the use of this soil as a site for septic tank absorption fields. Placing the filter lines on the contour helps to prevent hillside seepage and contamination of surface water. Subsurface drains help to lower the seasonal high water table.

The land capability classification is IIIe.

453D3—Muren silt loam, 10 to 15 percent slopes, severely eroded. This is a strongly sloping, moderately well drained soil on upland side slopes. The areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsoil is about 38 inches thick. In the upper part it is brown, friable silt loam. In the next part it is yellowish brown and brown, mottled, friable silty clay loam. In the lower part it is gray and dark brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is gray, dark brown, and light brownish gray, mottled, friable silt loam. In places the subsoil and the underlying material have more sand and small pebbles.

Water and air move through this Muren soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water is 2 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is low. Reaction in the subsoil is medium acid or strongly acid. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is poorly suited to cultivated crops and well suited to pasture and hay. It is moderately suited to use as a site for dwellings without basements and poorly suited to use as a site for dwellings with basements. It is poorly suited to use as a site for septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a severe hazard. Resource management systems that include crop rotations with 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface, contour farming, terraces, or a combination of these practices help to control erosion and to maintain soil productivity.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Overgrazing causes reduced forage yields, surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table is a moderate limitation affecting the use of this soil as a site for dwellings without basements and a severe limitation on sites for dwellings with basements. The slope and the shrink-swell potential are moderate limitations on sites for dwellings with or without basements. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. Land shaping by cutting and filling is needed to prepare building sites. Erosion is a hazard during construction. Removing the plant cover only from those sites under active construction reduces soil loss and sediment damage. Topsoil can be stockpiled and later returned to the site. Seeding or sodding all disturbed areas as soon as possible helps to control erosion.

The slope and the seasonal high water table are limitations affecting the use of this soil as a site for septic tank absorption fields. Placing the filter lines on the contour helps to overcome the slope and helps to prevent hillside seepage and contamination of surface water. Subsurface drains help to lower the seasonal high water table.

The land capability classification is IVe.

457—Booker clay. This is a nearly level, very poorly drained soil on broad flats and in depressions on flood plains along the major rivers. It is protected by a levee system but is subject to occasional flooding for brief periods in spring. It is frequently ponded in spring. The areas are irregular in shape and range from 20 to 400 acres.

Typically, the surface soil is very dark gray, very firm clay about 13 inches thick. The subsoil is mottled, very firm clay about 47 inches thick. In the upper part it is olive gray, in the next part it is gray and dark grayish brown, and in the lower part it is olive gray. In places the subsoil and the underlying material have more sand and less clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Dupo and Nameoki soils. Dupo soils have at least 20 inches of silt loam overwash and are near the streams. Nameoki soils are on low ridges. They have more sand in the lower part of the subsoil and in the underlying material than the Booker soil. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Booker soil at a very slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below in spring. Available water capacity is moderate. Organic matter content also is moderate. Reaction in the subsoil is medium acid to neutral. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is very high. The potential for frost action is moderate.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and poorly suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. The soil is protected from frequent flooding by a levee, but it is occasionally flooded or ponded by surface runoff. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility.

If this soil is used for pasture and hay, the seasonal high water table reduces yields. Water-tolerant grasses and legumes are suitable. Removing excess water with surface ditches helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

This soil is moderately suited to use as habitat for wetland wildlife. It is suited to grain and seed crops, grasses, wild herbaceous plants, and hardwood species. The native plant species provide food and cover for wetland wildlife, such as ducks, muskrat, mink, and shore birds. Shallow water areas for waterfowl can be easily developed. Protection from fire and grazing is essential.

The land capability classification is IIIw.

517A—Marine silt loam, 0 to 2 percent slopes. This is a nearly level, somewhat poorly drained soil on broad upland ridges. The areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is grayish brown, friable silt loam about 10 inches thick. The subsurface layer is light brownish gray, friable silt loam about 4 inches thick. The subsoil is about 36 inches thick. In the upper part it is brown, mottled, firm silty clay loam. In the next part it is brown, mottled, firm silty clay. In the lower part it is

grayish brown, mottled, friable silty clay loam and gray, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is gray, mottled, friable silt loam. In some places the subsoil has less clay. In other places it has a high amount of sodium. In some areas the surface layer and the subsoil have been mixed by cultivation.

Included with this soil in mapping are small areas of the poorly drained Rushville soils at the head of drainageways and in slight depressions. The included areas make up 2 to 5 percent of the map unit.

Water and air move through this Marine soil at a slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1 foot to 2 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to slightly acid. After hard rains, a crust commonly forms on the surface. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is poorly suited to use as a site for septic tank absorption fields and dwellings.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table is a limitation. It can be lowered by surface ditches. Keeping tillage operations to a minimum and returning crop residue to the soil improve soil tilth and soil fertility, reduce crusting, and increase water infiltration. Low reaction in the subsoil restricts the availability of plant nutrients. Crops respond well to fertilizer if this soil is adequately limed. In some years the soil does not supply enough moisture for optimum corn yields because of the high clay content in the subsoil. Grain sorghum and soybean yields are less affected by the reduced amount of available water.

If this soil is used for pasture and hay, water-tolerant grasses and legumes are suitable. Additions of lime increase the availability of plant nutrients. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth. Removing excess water with surface ditches helps to reduce winterkill and frost heave.

The seasonal high water table and the high shrink-swell potential are severe limitations affecting the use of this soil as a site for dwellings. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow permeability are severe limitations affecting the use of this soil as a site for septic tank absorption fields. Subsurface drains help to lower the water table. Enlarging the absorption area or replacing the soil with more permeable material helps to overcome the slow permeability.

The land capability classification is IIw.

517B—Marine silt loam, 2 to 5 percent slopes. This is a gently sloping, somewhat poorly drained soil on upland ridges and side slopes. The areas are irregular in shape and range from 5 to 150 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 4 inches thick. The subsoil is about 40 inches thick. In the upper part it is brown, mottled, firm silty clay loam. In the next part it is brown, mottled, firm silty clay. In the lower part it is light brownish gray, mottled, firm and friable silty clay loam and silt loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In areas where the surface layer and the subsoil have been mixed through tillage, the surface layer has more clay. In some areas the subsoil has less clay. In other areas it has more sodium.

Included with this soil in mapping are small areas of the poorly drained Rushville soils in depressions and at the head of drainageways. The included areas make up 2 to 5 percent of the map unit.

Water and air move through this Marine soil at a slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 1 foot to 2 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to slightly acid. After hard rains, a crust commonly forms on the surface. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is poorly suited to use as a site for septic tank absorption fields and dwellings.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Contour farming and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion, reduce crusting, and increase water infiltration. Additions of lime help to make plant nutrients more available. Surface ditches lower the seasonal high water table. In some years this soil does not supply enough moisture for optimum corn yields because of the high clay content in the subsoil. Grain sorghum and soybean yields are less affected by the reduced amount of available water.

If this soil is used for pasture and hay, water-tolerant grasses and legumes are suitable. Erosion is a hazard, particularly during the establishment period. Seeding on the contour helps to control erosion. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth. Removing excess water with

subsurface drains helps to reduce winterkill and frost heave.

The seasonal high water table and the high shrink-swell potential are severe limitations affecting the use of this soil as a site for dwellings. Installing tile drains around the base of foundations lowers the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and the slow permeability are severe limitations affecting the use of this soil as a site for septic tank absorption fields. Subsurface drains help to lower the seasonal high water table. Enlarging the absorption area or replacing the soil with more permeable material helps to overcome the slow permeability.

The land capability classification is IIe.

591—Fults silty clay. This is a nearly level, poorly drained soil in swales and on broad, low ridges on flood plains. It is protected by a levee system but is subject to occasional flooding for brief periods in spring. The areas are irregular in shape and range from 20 to 200 acres.

Typically, the surface soil is very dark gray, very firm silty clay about 12 inches thick. The subsoil is about 30 inches thick. In the upper part it is dark gray, mottled, very firm clay. In the next part it is dark gray, mottled, friable clay loam. In the lower part it is gray, mottled, very friable sandy clay loam. The underlying material to a depth of 60 inches or more is gray, mottled sandy loam. In some places the subsoil is thinner and the underlying material is closer to the surface. In other places the subsoil has more sand. In some areas the lower part of the subsoil and the underlying material have more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Nameoki and Riley soils on the slightly higher parts of the landscape. Riley soils have more sand in the subsoil than the Fults soil. The included areas make up 2 to 5 percent of the map unit.

Water and air move at a very slow rate through the upper part of this Fults soil and at a moderately rapid rate through the underlying material. In cultivated areas surface runoff is slow. The seasonal high water table is within 2 feet of the surface in the spring. Available water capacity is moderate. Organic matter content also is moderate. Reaction in the subsoil is slightly acid to mildly alkaline. The surface layer is easily tilled only within a narrow range in moisture content. The shrink-swell potential is high in the upper part of the subsoil. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and poorly suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting and reduces yields. The levee protects this soil from frequent flooding by the river, but the soil is occasionally flooded by surface runoff. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility and increase water infiltration.

If this soil is used for pasture and hay, the seasonal high water table reduces yields. Water-tolerant grasses and legumes are suitable. Removing excess water with surface ditches helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIw.

592—Nameoki silty clay. This is a nearly level, somewhat poorly drained soil on low ridges and terraces on flood plains. It is protected by a levee system but is subject to rare flooding. The areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface soil is very dark gray and very dark grayish brown, firm silty clay about 14 inches thick. The subsoil is about 42 inches thick. In the upper part it is dark brown, mottled, firm clay. In the next part it is dark grayish brown, mottled, friable silty clay loam. In the lower part it is dark grayish brown, mottled, friable clay loam. The underlying material to a depth of 60 inches or more is dark grayish brown, mottled sandy loam. In some areas the surface layer is thinner and has less clay. In some places the subsoil has more sand. In other places it extends below a depth of 60 inches.

Included with this soil in mapping are small areas of the poorly drained Ambraw and Fults and well drained Landes soils. Ambraw and Fults soils are in swales and in the lower positions on the landscape. Ambraw soils formed in loamy alluvium. Landes soils formed entirely in loamy alluvium on the higher ridges. The included areas make up 10 to 15 percent of the map unit.

Water and air move through the subsoil of this Nameoki soil at a very slow rate and through the underlying material at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1 foot to 3 feet below the surface in spring. Available water capacity is moderate. Organic matter content also is moderate. Reaction in the subsoil is strongly acid to mildly alkaline. The surface layer is easily tilled only within a narrow range in moisture content. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. The levee protects the soil from flooding by the river. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility and increase water infiltration.

If this soil is used for pasture and hay, the seasonal high water table reduces yields. Water-tolerant grasses and legumes are suitable. Removing excess water with surface ditches helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIw.

605F—Ursa silt loam, 20 to 35 percent slopes. This is a steep, well drained soil on upland side slopes. The areas are irregular in shape and range from 20 to 400 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 2 inches thick. The subsurface layer is brown, friable loam about 4 inches thick. The subsoil is about 54 inches thick. In the upper part it is strong brown, mottled, friable loam. In the next part it is strong brown, mottled, firm clay loam and clay. In the lower part it is gray, brown, and light brownish gray, mottled, firm clay loam. In some places the surface layer has more clay. In other places the subsoil has less clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Atlas soils at the head of drainageways and on the less sloping parts of the landscape. Also included are areas where sandstone crops out on the lower part of slopes and in some drainageways. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Ursa soil at a slow rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to neutral. The shrink-swell potential is high. The potential for frost action is moderate.

In most areas this soil supports native hardwood trees. A few areas have been cleared for pasture. The soil is moderately suited to use as woodland and well suited to use as habitat for woodland wildlife. It is moderately suited to pasture and generally is not suited to hay because of the slope. It is generally not suited to cultivated crops and to use as a site for septic tank absorption fields and dwellings because of the slope.

Because of the slope and the high clay content of this soil, the main concerns in managing woodland are the erosion hazard, the equipment limitation, and seedling mortality. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or a grass-legume mixture after the completion of logging operations helps to control erosion. Limiting the use of equipment to periods when the soil is firm reduces the equipment limitation. Planting stock that is larger than is typical helps to reduce seedling mortality. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

This soil has good potential for use as habitat for woodland wildlife and fair potential for use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the steep slopes and low fertility limit the extent of grain and seed crops. In areas of native hardwoods, the soil has good potential for use as habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

If this soil is used for pasture, the erosion hazard is severe, especially during the establishment period. Proper stocking rates, rotation grazing, timely deferment of grazing, weed control, and restricted grazing during wet periods help to maintain an adequate stand of pasture plants. The steep slopes limit the use of equipment.

The land capability classification is VIIe.

621B2—Coulterville silt loam, 2 to 5 percent slopes, eroded. This is a gently sloping, somewhat poorly drained soil on upland ridges and side slopes. The areas are irregular in shape and range from 15 to 40 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 49 inches thick. In the upper part it is brown, mottled, friable silty clay loam. In the next part it is gray, mottled, friable silty clay loam. In the lower part it is gray, light olive gray, olive, and brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is brown, mottled silt loam. In some areas the subsoil is grayer. In other areas it has more clay. In places it does not have significant amounts of sodium.

Included with this soil in mapping are small areas of the poorly drained Coulterville Variant soils in depressions and the lower positions on the landscape. Also included are "scald spots" where the surface layer has a high content of sodium. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Coulterville soil at a slow rate. In cultivated areas surface runoff is medium. The seasonal water table is 1 foot to 3 feet below the surface in spring. Available water capacity is moderate. Organic matter content is low. Reaction in the subsoil is strongly acid to mildly alkaline in the upper part and mildly alkaline or moderately alkaline in the lower part.

After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high. The content of sodium is high enough to adversely affect the growth of most crops.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Resource management systems that include a conservation tillage system, contour farming, terraces, or a combination of these practices help to control erosion. Returning crop residue to the soil improves soil fertility and soil tilth, reduces crusting, and increases water infiltration. The high content of sodium in the subsoil restricts the availability of water and interferes with the uptake of plant nutrients. During dry periods crops commonly show signs of stress because of the sodium content. Soybean, grain sorghum, and wheat yields are less affected than corn yields by the high sodium content. During construction of terraces, grassed waterways, and structures, special care must be taken so as not to leave the subsoil exposed. Revegetation of the exposed subsoil is extremely difficult.

If this soil is used for pasture and hay, water-tolerant grasses and legumes are suitable. Erosion is a hazard, particularly during the establishment period. Seeding on the contour helps to control erosion. Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth. Removing excess water with subsurface drains helps to reduce winterkill and frost heave.

The seasonal high water table and the moderate shrink-swell potential are limitations affecting the use of this soil as a site for dwellings. Installing tile lines around the base of foundations helps to lower the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. During construction, leaving as much vegetation on the surface as possible helps to control erosion. Seeding or sodding disturbed areas also helps to control erosion.

The seasonal high water table and the slow permeability are severe limitations affecting the use of this soil as a site for septic tank absorption fields. Subsurface drains help to lower the water table. Enlarging the absorption area or replacing the soil with more permeable material helps to overcome the slow permeability.

The land capability classification is IIe.

621C3—Coulterville silty clay loam, 5 to 10 percent slopes, severely eroded. This is a sloping, somewhat poorly drained soil on upland side slopes. The areas are irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is dark brown, friable silty clay loam about 9 inches thick. The subsoil is about 51 inches thick. In the upper part it is grayish brown, mottled, friable silty clay loam. In the lower part it is grayish, brown, mottled, firm clay loam. In some places the subsoil is thinner and has more sand and pebbles. In other places it has more clay. In some areas it does not have significant amounts of sodium.

Included with this soil in mapping are small areas of Blair soils. These soils are in positions on the landscape similar to those of the Coulterville soil. They do not have significant amounts of sodium. Also included are "scald spots" where the surface layer has a high content of sodium. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Coulterville soil at a slow rate. In cultivated areas surface runoff is medium. The seasonal water table is 1 foot to 3 feet below the surface in spring. Available water capacity is moderate. Organic matter content is low. Reaction in the subsoil is very strongly acid to mildly alkaline in the upper part and mildly alkaline or moderately alkaline in the lower part. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high. The content of sodium is high enough to adversely affect the growth of most plants.

In most areas this soil is used for cultivated crops. It is poorly suited to cultivated crops and moderately suited to pasture and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, the erosion hazard and the concentration of sodium in the subsoil limit yields. Resource management systems that include crop rotations with 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface, contour farming, terraces, or a combination of these practices help to keep soil losses within acceptable limits and thus help to maintain soil productivity. Returning crop residue to the soil reduces crusting and improves soil tilth. The high content of sodium in the subsoil restricts the availability of water and interferes with the uptake of plant nutrients. Crops commonly show signs of stress because of the sodium content. Soybean, grain sorghum, and wheat yields are less affected than corn yields by the sodium content. During construction of terraces, grassed waterways, and structures, special care must be taken not to leave the subsoil exposed. Revegetation of the exposed subsoil is extremely difficult.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing,

deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table, the moderate shrink-swell potential, and the slope are limitations affecting the use of this soil as a site for dwellings. Installing tile lines around the base of foundations helps to lower the seasonal high water table. Reinforcing foundations and widening foundation trenches and backfilling them with coarse material help to prevent the structural damage caused by shrinking and swelling. Land shaping by cutting and filling is commonly needed to prepare building sites. Slopes are difficult to revegetate, especially where the subsoil is exposed. Leaving as much vegetation on the surface as possible helps to control erosion. Seeding or sodding disturbed areas also helps to control erosion.

The seasonal high water table and the slow permeability are severe limitations affecting the use of this soil as a site for septic tank absorption fields. Subsurface drains help to lower the water table. Enlarging the absorption area or replacing the soil with more permeable material helps to overcome the slow permeability.

The land capability classification is IVe.

785G—Lacrescent flaggy silt loam, 30 to 70 percent slopes. This is a very steep, well drained soil at the base of limestone bluffs (fig. 13). The areas are linear in shape and range from 20 to 400 acres.

Typically, the surface layer is black flaggy silt loam about 18 inches thick. The underlying material to a depth of 60 inches or more is dark brown extremely flaggy silt loam. In places bedrock is within a depth of 60 inches. Some areas have steeper slopes.

Water and air move through this Lacrescent soil at a moderately rapid rate. Surface runoff is very rapid. Available water capacity is low. Organic matter content is moderate. The soil is mildly alkaline or moderately alkaline and is calcareous throughout. The shrink-swell potential is low. The potential for frost action is moderate.

In most areas this soil supports native trees and herbaceous plants. Tree growth is extremely slow because of the low available water capacity. The soil is not suited to cultivated crops, pasture, and hay or to use as a site for septic tank absorption fields and dwellings because of the slope.

In the wooded areas, the erosion hazard and the equipment limitation are woodland management concerns because of the slope. Other management concerns are the windthrow hazard and plant competition. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or a grass-legume mixture after completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Using harvesting methods that do not leave isolated or widely spaced trees and removing only high-value trees from a 50-foot-wide strip along the west and south edges of woodland help to reduce windthrow. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

In areas of native hardwoods, this soil has fair or good potential for use as habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

The land capability classification is VIIe.

787—Banlic silt loam. This is a nearly level, somewhat poorly drained soil on very low terraces along streams and drainageways (fig. 14). It is subject to rare flooding. The areas are linear in shape and range from 5 to 75 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsurface layer is grayish brown, friable silt loam about 4 inches thick. The subsoil to a depth of 60 inches or more is grayish brown, mottled silt loam. It is friable in the upper part and firm in the lower part. In some places the subsoil is thinner and the underlying material has more sand. In other places the subsoil has more sand.

Included with this soil in mapping are small areas of the poorly drained Birds and moderately well drained Wilbur soils. These soils do not have firm layers in the lower part of the subsoil. Birds soils are in the lower areas near drainageways. Wilbur soils are in the slightly higher areas. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Banlic soil at a slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1 foot to 3 feet below the surface in spring. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is very strongly acid to neutral. The shrink-swell potential is low. The potential for frost action is high. Rooting depth is restricted in the lower part of the subsoil.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately well suited to pasture and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table delays planting in some

Figure 13.—An area of Lacrescent flaggy silt loam, 30 to 70 percent slopes, on the face of a limestone bluff. Wilbur silt loam is on the bottom lands in the foreground.

years. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility.

If this soil is used for pasture and hay, the seasonal high water table is a limitation. Water-tolerant grasses and legumes are suitable. Delaying grazing when the soil is wet improves forage production, helps to prevent surface compaction and deterioration of soil tilth, and helps to maintain the pasture.

The land capability classification is IIw.

802D—Orthents, loamy, rolling. These are well drained and moderately well drained soils in areas where the landscape has been modified by filling, leveling, and shaping. The areas occur as cloverleafs of highways, areas adjacent to gravel pits, and fill areas. They are rectangular or irregularly shaped and range from 10 to 150 acres.

Typically, the surface layer is dark brown, friable silt loam. The substratum to a depth of 60 inches or more is layered material that is dominantly silt loam. Some layers have been densely compacted during placement. In some places more sand is mixed throughout the profile. In other places gravel and large stones are mixed throughout. The soil material varies widely and does not occur in a consistent pattern.

Included with these soils in mapping are urban areas where concrete, asphalt, buildings, streets, and parking lots cover as much as 65 percent of the surface. Also included are some areas where slopes are steep and very steep. The included areas make up 10 to 15 percent of the map unit.

Available water capacity generally is moderate or high in the Orthents, but it varies widely. Permeability also varies widely because the soils have been compacted by construction equipment and because the texture varies from place to place. Generally, organic matter content is moderate and soil fertility is medium.

Most areas of these soils are idle or are developed for urban or other nonfarm uses. Unless a good plant cover protects the surface, erosion is a severe hazard. In the more sloping areas, it is an especially severe hazard. In severely eroded areas, special management is needed to establish and maintain a plant cover. Onsite investigation is needed to determine the limitations or hazards affecting the use of specific areas.

This map unit has not been assigned a land capability classification.

807—Aquents-Orthents complex. This map unit consists of soils on a levee and in the borrow area adjacent to the levee (fig. 15). In most places a road is on top of the levee. The Aquents are nearly level, poorly drained soils in the depressional borrow areas on the unprotected side of the levee. These soils are subject to frequent flooding for very long periods. They are generally ponded during part of the growing season. The Orthents are moderately steep to very steep, well drained soils on the sides, top, and aprons of the levee. The areas of this complex are narrow and linear in shape and are several hundred acres. They are 65 to 75 percent Aquents and 25 to 35 percent Orthents. The Aquents and Orthents are in areas so small and narrow that it was not practical to map them separately.

Typically, the surface layer of the Aquents is dark gray silty clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is mottled, stratified silt loam, very fine sandy loam, loam, and sandy loam. Colors include very dark gray, dark gray, light yellowish brown, and brown. Some areas have been leveled or filled. In places the underlying material has

Figure 14.—An area of Banlic silt loam in the foreground. Blair silty clay loam, 5 to 10 percent slopes, severely eroded, is in the background.

Figure 15.—This levee, built by the Corps of Engineers, prevents flooding in farmed areas on bottom lands called the Great American Bottoms.

more clay. Some small areas are ponded throughout the year.

Typically, the surface layer of the Orthents is stratified very dark grayish brown, dark brown, and grayish brown, friable very fine sandy loam, silty clay, and clay. The underlying material to a depth of 60 inches or more is stratified, calcareous, dark grayish brown, very dark grayish brown, and grayish brown silt loam, very fine sandy loam, and very fine sand. In some places more clay is throughout the profile.

Water and air move through these soils at a slow to moderate rate. Surface runoff is ponded on the Aquents and medium or rapid on the Orthents. In most years the Aquents have a seasonal high water table 1.0 foot above to 0.5 foot below the surface for extended periods. Available water capacity is high in both the Aquents and the Orthents. Organic matter content is low to moderate. Reaction ranges from medium acid to moderately alkaline throughout the profile. The shrink-swell potential and the potential for frost action are moderate or high.

In most areas the Aquents support stands of cottonwood or a recent growth of willows and cattails. The Orthents are protected by a good cover of grasses and legumes. This map unit is within a drainage district, and land use is restricted. The soils are generally not suited to cultivated crops or to use as sites for dwellings and septic tank absorption fields because of the flooding and the slope.

The Aquents are well suited to wetland plants and to use as habitat for wetland wildlife. The native plant species on these soils provide food and cover for wetland wildlife, such as ducks, muskrat, mink, and shore birds. Shallow water areas for waterfowl can be easily developed. Protection from fire and grazing is essential.

This map unit has not been assigned a land capability classification.

864—Pits, quarries. This map unit consists of open excavations from which limestone has been mined. Areas of this unit are blocky and range from 50 to 80 acres. The excavations are about 50 to 100 feet deep and consist of horizontal layers of bedrock.

Included with this unit in mapping are areas surrounding the pits and horizontal shafts where overburden soil material has been mixed with rock fragments and other debris during mining operations. The included areas make up 5 to 10 percent of the map unit.

The limestone from active quarries is used for agricultural lime and for road construction and maintenance.

This map unit has not been assigned a land capability classification.

988F—Westmore-Neotoma complex, 20 to 35 percent slopes. These steep, well drained soils are on upland side slopes. The Westmore soil is on the upper part of the side slopes, and the Neotoma soil is on the lower part. The areas are irregular in shape and range from 20 to 300 acres. They are 65 to 75 percent Westmore soil and 25 to 35 percent Neotoma soil. The two soils occur in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Westmore soil is very dark grayish brown, friable silt loam about 2 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil is about 54 inches thick. In the upper part it is yellowish brown and strong brown, friable silt loam. In the next part it is strong brown and brown, friable silty clay loam. In the lower part it is brown and strong brown, firm silty clay and clay and has sandstone fragments. In some areas sandstone bedrock is less than 48 inches below the surface. In some places the lower part of the subsoil has less clay. In other places the subsoil formed in a fine textured paleosol and has more clay.

Typically, the surface layer of the Neotoma soil is very dark grayish brown, friable flaggy silt loam about 3 inches thick. The subsurface layer is brown, friable very flaggy silt loam about 4 inches thick. The subsoil to a depth of about 60 inches is strong brown and yellowish red, stratified extremely flaggy loam, extremely flaggy sandy loam, and very flaggy sandy clay loam. In places the subsoil has more clay. In some areas sandstone and shale bedrock is within 40 inches of the surface.

Included with these soils in mapping are small areas of bedrock outcrops and escarpments. The included areas make up 10 to 15 percent of the map unit.

Water and air move through the upper part of the Westmore soil at a moderate rate and through the lower part at a slow rate. They move through the Neotoma soil at a moderately rapid rate. On both soils surface runoff is rapid. Available water capacity is moderate in the Westmore soil and very low in the Neotoma soil. Organic matter content is moderately low in both soils. Reaction is very strongly acid to neutral in the subsoil of the Westmore soil and very strongly acid to medium acid in the subsoil of the Neotoma soil. The shrink-swell potential and the potential for frost action are high in the Westmore soil and low in the Neotoma soil.

In most areas these soils support native trees and herbaceous plants. They are well suited to use as woodland and habitat for woodland wildlife. They are generally not suited to cultivated crops because of the slope. The Westmore soil is well suited to pasture and hay, but the Neotoma soil is poorly suited. Both soils are generally not suited to use as sites for septic tank absorption fields and dwellings because of the slope and the large stones in the Neotoma soil.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because of the slope. Other management concerns are seedling mortality on the Westmore soil and plant competition on the Neotoma soil. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging operations to grass or a grass-legume mixture after completion of logging operations helps to control erosion. Equipment use is restricted to periods when the soil is sufficiently firm and dry for good traction. Planting stock that is larger than is typical helps to reduce seedling mortality. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

These soils have good potential for use as habitat for woodland wildlife and fair potential for use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the steep slopes and low fertility limit the extent of grain and seed crops. Protection from fire and grazing is essential.

The land capability classification is VIIe.

1302—Ambraw silty clay loam, wet. This is a nearly level, poorly drained soil in swales and depressions on flood plains. It is protected by a levee system but is frequently ponded by runoff from adjacent areas and by the seasonal high water table. The areas are irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsurface layer is very dark gray, mottled, friable clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown, grayish brown, dark gray, gray, and dark brown, mottled, stratified silty

clay, silty clay loam, very fine sandy loam, loamy sand, and sand. In some places the underlying material has more clay. In other places it has more sand.

Included with this soil in mapping are small areas of the very poorly drained Aquents and the moderately well drained Haynie soils. Aquents are in the lower landscape positions and in most years are flooded or ponded during part of the growing season. Haynie soils are on ridges and the higher terraces. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Ambraw soil at a moderate rate. Surface runoff is very slow or ponded. The seasonal high water table is 3 feet above the surface to 1 foot below in spring. Available water capacity is high. Organic matter content is moderate. Reaction is mildly alkaline or moderately alkaline. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and poorly suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn or soybeans, the seasonal high water table and flooding delay planting in some years. Surface ditches help to remove excess water. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility and increase water infiltration.

If this soil is used for pasture and hay, the seasonal high water table reduces yields. Water-tolerant grasses and legumes are suitable. Removing excess water with surface ditches helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

The land capability classification is IIIw.

1457—Booker clay, wet. This is a nearly level, very poorly drained soil on broad flats and in closed depressions on the flood plains along the major rivers. It is subject to frequent flooding and ponding for long periods in spring and early summer. The areas are irregular in shape and range from 10 to 300 acres.

Typically, the surface soil is very dark gray, very firm silty clay about 16 inches thick. The subsoil is dark gray and gray, mottled, very firm clay about 44 inches thick. In places it has more sand.

Water and air move through this Booker soil at a very slow rate. Surface runoff is slow to ponded. In most years the soil has standing water in winter and spring and is too wet for tillage. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is medium acid to neutral. The shrink-swell potential is very high. The potential for frost action is moderate.

In most areas this soil supports native wetland plants and is used as habitat for wetland wildlife. It is generally not suited to cultivated crops, pasture, and hay or to use as a site for septic tank absorption fields and dwellings because of the flooding, the seasonal high water table, and the very slow permeability.

This soil is well suited to wetland plants and to use as habitat for wetland wildlife. The native plant species provide food and cover for wetland wildlife, such as ducks, muskrat, mink, and shore birds. Shallow water areas for waterfowl can be easily developed. Protection from fire and grazing is essential.

The land capability classification is Vw.

3092B—Sarpy fine sand, frequently flooded, 1 to 7 percent slopes. This is a gently sloping, excessively drained soil on undulating terrace ridges on the flood plain between the Mississippi River and a levee. The soil is subject to frequent flooding for long periods in winter and spring. The areas are irregular in shape and range from 30 to 60 acres.

Typically, the surface layer is dark grayish brown, very friable, calcareous fine sand about 9 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown, loose, calcareous fine sand. In some places the soil has thin strata of silt loam, silty clay loam, silty clay, and clay loam throughout. In other places the surface layer and the upper part of the underlying material are not calcareous. In many areas along old channels, slopes are short and steep.

Included with this soil in mapping are small areas of the poorly drained Ambraw soils in swales and depressions. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Sarpy soil at a rapid rate. Surface runoff is slow. Available water capacity is low. Organic matter content also is low. The soil is neutral to moderately alkaline throughout. The shrink-swell potential and the potential for frost action are low.

In most areas this soil is used for cultivated crops or supports native trees and herbaceous plants. It is poorly suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for cultivated crops, the main management concerns are the flooding hazard and droughtiness. In most years flooding delays or prevents planting. Soybean yields are generally less affected by late planting than corn yields because soybeans require a shorter growing season. Crops that can tolerate droughty conditions or that mature before the hot, dry part of summer should be selected for planting. Leaving crop residue on the surface helps to control soil blowing and conserves soil moisture.

Flooding and droughtiness limit the use of this soil for pasture and hay. Forage production is low because few legume and grass species can tolerate the long periods

of flooding. Restricted grazing after these periods helps to maintain the pasture.

The land capability classification is IVs.

3302—Ambraw silty clay loam, frequently flooded. This is a nearly level, poorly drained soil in swales and depressions on flood plains between the Mississippi River and a levee. The soil is subject to frequent flooding and ponding for long periods in spring. The areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is very dark grayish brown, friable silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very dark grayish brown, dark grayish brown, and grayish brown, mottled silty clay loam, silt loam, loam, loamy fine sand, and fine sandy loam. In some areas the underlying material has more clay. In places slopes are short and steep.

Included with this soil in mapping are small areas of the very poorly drained Aquents and the moderately well drained Haynie soils. Aquents are in the lower landscape positions and are frequently flooded or ponded during the growing season. Haynie soils are on ridges and the higher terraces. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Ambraw soil at a moderate rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table is 3 feet above the surface to 1 foot below in spring. Available water capacity is high. Organic matter content also is high. Reaction is mildly alkaline or moderately alkaline. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops or supports native trees and herbaceous plants. It is poorly suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn or soybeans, the main management concern is flooding, which commonly delays or prevents planting. Soybeans require a shorter growing season; thus, soybean yields are generally less affected by late planting than corn yields. Conservation tillage and crop residue management help to maintain soil fertility and soil tilth.

Flooding limits the use of this soil for pasture and hay. Forage production is low because few legume and grass species can tolerate the long periods of flooding. Restricted use after these periods helps to maintain the pasture.

This soil is well suited to wetland plants and to use as habitat for wetland wildlife. The native plant species provide food and cover for wetland wildlife, such as ducks, muskrat, mink, and shore birds. Shallow water areas for waterfowl can be easily developed. Protection from fire and grazing is essential.

The land capability classification is IVw.

3333—Wakeland silt loam, frequently flooded. This is a nearly level, somewhat poorly drained soil on flood plains along the major streams. It is subject to frequent flooding for long periods in spring. The areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface soil is dark grayish brown, mottled, friable silt loam about 12 inches thick. The underlying material is grayish brown, gray, and dark grayish brown, mottled, friable silt loam about 48 inches thick. In places it is more acid.

Included with this soil in mapping are small areas of the poorly drained Birds and moderately well drained Wilbur soils. Birds soils are in the lower positions on the landscape. Wilbur soils are in the higher positions. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Wakeland soil at a moderate rate. In cultivated areas surface runoff is very slow. The seasonal high water table is 1 foot to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. The soil is medium acid to neutral throughout. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and poorly suited to pasture and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn or soybeans, the seasonal high water table and flooding delay planting in some years. Surface ditches help to remove excess water. Subsurface drains can be used if suitable outlets are available. Keeping tillage operations to a minimum and returning crop residue to the soil help to maintain soil tilth and soil fertility.

If this soil is used for pasture and hay, water-tolerant legumes and grasses are suitable. Removing excess water with surface ditches and subsurface drains helps to reduce winterkill and frost heave. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted grazing during wet periods help to maintain the pasture.

This soil is well suited to use as habitat for woodland wildlife. It is suited to grasses, wild herbaceous plants, and hardwood species. When flooded, it provides temporary feeding and resting sites for migratory and resident waterfowl. Protection from fire and grazing is essential.

The land capability classification is IIIw.

3394B—Haynie silt loam, frequently flooded, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on undulating ridges on flood plains. It is not protected by a levee and is subject to frequent flooding for long periods in spring. The areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsurface

layer is brown, very friable silt loam about 5 inches thick. The underlying material to a depth of 60 inches or more is stratified silt loam, loam, and silty clay loam. In some places it has more clay. In other places the soil has more sand and is less stratified throughout. Some areas have short, steep slopes.

Included with this soil in mapping are small areas of the poorly drained Ambraw soils in swales and depressions. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Haynie soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. The soil is mildly alkaline or moderately alkaline throughout. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is used for cultivated crops or supports native trees and herbaceous plants. It is moderately suited to cultivated crops and poorly suited to pasture and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn or soybeans, flooding delays or prevents planting in some years. Soybeans require a shorter growing season; thus, soybean yields are generally less affected by late planting than corn yields.

Flooding limits the use of this soil for pasture and hay. Forage production is low because few legume and grass species can tolerate the long periods of flooding. Restricted use after these periods helps to maintain the pasture.

In the wooded areas, plant competition is a management concern. It affects seedlings of desirable species. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

The land capability classification is IIIw.

5308C—Alford silt loam, karst, 5 to 12 percent slopes. This is a sloping, well drained soil on ridges between depressions and on side slopes of the conical depressions in areas of karst terrain. Nearly all depressions or sinkholes have closed bottoms and are cultivated; however, some have open bottoms that allow surface water to drain directly into creviced bedrock. The areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsoil is about 49 inches thick. In the upper part it is dark yellowish brown and dark brown, friable silt loam. In the next part it is yellowish brown, friable silty clay loam. In the lower part it is yellowish brown and dark brown, friable silt loam. The underlying material to a depth of 60 inches or more is dark brown, friable silt loam. In areas where the surface layer and the subsoil have been mixed through cultivation, the surface layer has more clay. In places the subsoil has continuous silt coatings in the middle part and is brittle in the lower part.

Included with this soil in mapping are small areas of the moderately well drained Muren and somewhat poorly drained Wakeland soils. Muren soils are on broad ridges between depressions. The nearly level Wakeland soils formed in alluvium on the bottoms of the depressions. Also included are some areas where the depressions are intermittently ponded. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. Surface runoff is medium and generally converges within a sinkhole. Available water capacity is high. Organic matter content is moderately low. Reaction is very strongly acid to slightly acid in the subsoil. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and well suited to pasture and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. It is difficult to control because of the complex pattern of the slopes. Resource management systems that include crop rotations with 1 or more years of forage crops and a conservation tillage system that leaves crop residue on the surface after planting help to keep soil losses within acceptable limits and thus help to maintain soil productivity. Returning crop residue to the soil reduces crusting and improves soil tilth.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Allowing sufficient time for pasture plants to become established and preventing overgrazing help to maintain the pasture. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to maintain the pasture.

The shrink-swell potential and the slope are limitations affecting the use of this soil as a site for dwellings. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. During construction, erosion is a hazard. Removing plant cover only from those sites under active construction helps to control erosion and sedimentation. Topsoil can be stockpiled and later

returned to the site. Seeding or sodding all disturbed areas as soon as possible helps to control erosion. Land shaping by cutting and filling is commonly needed to prepare building sites. Subsidence is a continuing hazard on sites for both septic tank absorption fields and dwellings.

If this soil is used as a site for septic tank absorption fields, ground water contamination is a hazard. Laying out the absorption fields on the contour helps to prevent hillside seepage and contamination of surface water.

The land capability classification is IIIe.

5308E—Alford silt loam, karst, 12 to 25 percent slopes. This is a moderately steep, well drained soil on ridges between depressions and on side slopes of conical depressions in areas of karst terrain (fig. 16). Some depressions or sinkholes have closed bottoms, but most have open bottoms that allow surface water to drain directly into creviced bedrock. The areas are irregular in shape and range from 5 to 200 acres.

Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsoil is friable silt loam about 43 inches thick. In the upper part it is yellowish brown, and in the lower part it is strong brown. The underlying material to a depth of 60 inches or more is dark brown, friable silt loam. In many areas the surface layer is eroded and is mixed with the subsoil. Loam glacial till is exposed near the bottom of some sinkholes. In places the subsoil has continuous silt coatings in the middle part and is firm in the lower part.

Included with this soil in mapping are small areas of the moderately well drained, gently sloping Muren soils on broad ridgetops. Also included are areas where bedrock is exposed near the bottom of the larger

Figure 16.—A sinkhole in a pastured area of Alford silt loam, karst, 12 to 25 percent slopes.

sinkholes. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. Surface runoff is rapid and generally flows inward and converges within a sinkhole. Available water capacity is high. Organic matter content is low. Reaction in the subsoil is very strongly acid to medium acid. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for pasture and hay or supports native hardwoods. It is generally not suited to cultivated crops because of the steep, irregular slopes and the erosion hazard. It is well suited to pasture and hay and to woodland. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of potential ground water contamination, slope, and the possibility of future subsidence. It is well suited to recreation uses, such as paths and trails, camp areas, and picnic areas.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. In some sinkholes outlet pipes have been installed and the sinkholes have been backfilled in an attempt to control erosion. Attempts at filling or sealing the sinkholes, however, generally have been unsuccessful. Allowing pasture plants sufficient time to become established and preventing overgrazing help to maintain the pasture. Proper stocking rates, rotation grazing, timely deferment of grazing, weed control, and restricted grazing during wet periods also help to maintain the pasture. The moderately steep slopes limit the use of haying equipment.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because of the slope. Another management concern is plant competition, which affects seedlings of desirable species. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging to grass or a grass-legume mixture after completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

This soil is well suited to use as habitat for woodland wildlife and is moderately suited to use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the moderately steep slopes and low soil fertility limit the extent of grain and seed crops. Protection from fire and grazing is essential.

This soil is in scenic areas and provides a natural setting for the establishment of paths and trails, camp areas, and picnic areas. Interconnected ridges separate the sinkholes. The ridges are a few feet to several hundred feet wide. They are suitable sites for paths and trails. Laying out the paths and trails on the contour and excluding vehicular traffic help to control erosion. The wider ridges are suitable as camp and picnic areas. Maintaining an adequate cover of vegetation helps to control erosion. Poisonous snakes are common in the sinkholes.

The land capability classification is VIe.

5308G—Alford silt loam, karst, 25 to 55 percent slopes. This is a very steep, well drained soil on ridges between depressions and on side slopes of the conical depressions in areas of karst terrain. The depressions or sinkholes have open bottoms that allow surface water to drain directly into creviced bedrock. The areas are irregular in shape and range from 5 to 250 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is brown, friable silt loam about 2 inches thick. The subsoil is friable silt loam about 54 inches thick. In the upper part it is yellowish brown, and in the lower part it is dark yellowish brown. In some areas the surface layer is eroded and has been mixed with the subsoil. Loam glacial till is exposed near the bottom of some sinkholes.

Included with this soil in mapping are small areas of the moderately well drained, gently sloping Muren soils on broad ridgetops. Also included are many areas where bedrock is exposed near the bottom of the sinkholes. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Alford soil at a moderate rate. Surface runoff is very rapid and generally flows inward and converges within a sinkhole. Available water capacity is high. Organic matter content is low. Reaction in the subsoil is very strongly acid to medium acid. The shrink-swell potential is moderate. The potential for frost action is high. Attempts at filling or sealing the sinkholes have generally been unsuccessful.

In most areas this soil supports native hardwoods. It is generally not suited to cultivated crops, hay, and pasture because of the very steep, irregular slopes and a severe erosion hazard. It is well suited to woodland. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of potential ground water contamination, slope, and the possibility of future subsidence. It is well suited to recreation uses, such as paths and trails, camp areas, and picnic areas.

In the wooded areas, the erosion hazard and the equipment limitation are management concerns because of the slope. Another management concern is plant

competition, which affects seedlings of desirable species. Laying out logging roads and skid trails on or as near the contour as possible helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Firebreaks of grass are needed. Seeding all bare areas created by logging to grass or a grass-legume mixture after completion of logging operations helps to control erosion. Limiting the use of machinery to periods when the soil is firm reduces the equipment limitation. Chemical or mechanical measures can reduce the competition from undesirable plants in openings created by timber harvesting operations. Excluding livestock from the woodland prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents damage to trees and helps to maintain the leaf mulch.

This soil is well suited to use as habitat for woodland wildlife but is poorly suited to use as habitat for openland wildlife. Adequate stands of herbaceous cover can be maintained, but the very steep slopes and low fertility limit the extent of grain and seed crops. In areas of native hardwoods, the soil has good potential for use as habitat for deer, wild turkey, squirrels, and other woodland wildlife. Protection from fire and grazing is essential.

This soil is in scenic areas and provides a natural setting for the establishment of paths and trails, camp areas, and picnic areas. Interconnected ridges separate the sinkholes. The ridges are a few feet to several hundred feet wide. They are suitable sites for paths and trails. Laying out the paths and trails on the contour and excluding vehicular traffic help to control erosion. The wider ridges are suitable as camp and picnic areas. Maintaining an adequate cover of vegetation helps to control erosion. Poisonous snakes are common in the sinkholes.

The land capability classification is VIIe.

5453B—Muren silt loam, karst, 2 to 5 percent slopes. This is a gently sloping, moderately well drained soil on ridges between depressions and on side slopes of conical depressions in areas of karst terrain. Nearly all depressions have closed bottoms and are cultivated. The areas are irregular in shape and range from 10 to 150 acres.

Typically, the surface layer is dark brown, friable silt loam about 9 inches thick. The subsoil is about 43 inches thick. In the upper part it is dark yellowish brown and yellowish brown, mottled, friable silty clay loam. In the lower part it is yellowish brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, friable silt loam. In places the surface layer has been mixed with a subsurface layer through tillage.

Included with this soil in mapping are small areas of the somewhat poorly drained Marine and Wakeland soils. Marine soils are on ridges and in slight depressions. Wakeland soils are on the bottoms of the sinkholes. The included soils make up 10 to 15 percent of the map unit.

Water and air move through this Muren soil at a moderate rate. In cultivated areas surface runoff is medium and generally flows inward and converges within a sinkhole. The seasonal high water table is 2 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is strongly acid or medium acid. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. Slopes are irregular and generally converge toward a sinkhole. A conservation tillage system that leaves crop residue on the surface after planting helps to control erosion and reduces crusting.

If this soil is used for pasture, overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table is a severe limitation affecting the use of this soil as a site for dwellings with basements and a moderate limitation on sites for dwellings without basements. The shrink-swell potential is a moderate limitation on sites for dwellings with or without basements. Reinforcing foundations and widening foundation trenches and backfilling them with suitable coarse material help to prevent the structural damage caused by shrinking and swelling. The seasonal high water table can be lowered by installing tile lines around the base of foundations. Subsidence is a continuing hazard on sites for both septic tank absorption fields and dwellings.

The seasonal high water table and a hazard of ground water contamination are the main problems affecting the use of this soil as a site for septic tank absorption fields. Subsurface drains help to lower the seasonal high water table. Installing the absorption fields on the contour helps to prevent hillside seepage and contamination of surface water.

The land capability classification is IIe.

5453C—Muren silt loam, karst, 5 to 12 percent slopes. This is a sloping, moderately well drained soil on ridges between depressions and on side slopes of conical depressions in areas of karst terrain. Nearly all depressions or sinkholes have closed bottoms and are

cultivated. Some have open bottoms that allow surface water to drain directly into creviced bedrock. The areas are irregular in shape and range from 10 to 80 acres.

Typically, the surface layer is dark yellowish brown, friable silt loam about 8 inches thick. The subsoil is about 37 inches thick. In the upper part it is dark yellowish brown, mottled, friable silty clay loam. In the lower part it is yellowish brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, friable silt loam. In places the surface layer is eroded and is mixed with the subsoil.

Included with this soil in mapping are small areas of the somewhat poorly drained Blair and Marine soils. Blair soils formed in silty sediments and are on the lower, severely eroded side slopes. Marine soils have more clay in the subsoil than the Muren soil. They are on the broader, flatter ridges. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Muren soil at a moderate rate. In cultivated areas surface runoff is medium and generally flows inward and converges within a sinkhole. The seasonal high water table is 2 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Reaction in the subsoil is strongly acid or medium acid. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops, pasture, or hay. It is moderately suited to cultivated crops and well suited to pasture and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, erosion is a hazard. It is difficult to control because of the irregular and complex pattern of the slopes. Resource management systems that include crop rotations with 1 or more years of forage crops and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion and maintain soil productivity. Returning crop residue to the soil reduces crusting and helps to maintain soil tilth.

If this soil is used for pasture and hay, erosion is a hazard, particularly during the establishment period. Seeding on the contour with a no-till seeder helps to control erosion. Overgrazing causes reduced forage yields, surface compaction, excessive runoff, and erosion. Pasture and hay planting, rotation grazing, deferred grazing, and fertilization help to maintain the pasture and control erosion.

The seasonal high water table is a severe limitation affecting the use of this soil as a site for dwellings with basements and a moderate limitation on sites for dwellings without basements. The shrink-swell potential and the slope are moderate limitations on sites for dwellings with or without basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains around the base of foundations helps to lower the seasonal high water table. Land shaping by cutting and filling is needed to prepare building sites. During construction, erosion is a hazard. Removing the plant cover only from those sites under active construction helps to control erosion and sedimentation. Topsoil can be stockpiled and later returned to the site. Seeding or sodding all disturbed areas as soon as possible helps to control erosion. Subsidence is a continuing hazard on sites for both septic tank absorption fields and dwellings.

The seasonal high water table and a hazard of ground water contamination are problems affecting the use of this soil as a site for septic tank absorption fields. Subsurface drains help to lower the seasonal high water table. Laying out the absorption fields on the contour helps to prevent hillside seepage and contamination of surface water.

The land capability classification is IIIe.

6621—Coulterville Variant silt loam. This is a nearly level, poorly drained soil on broad upland ridges and in shallow depressions. It is ponded for brief periods in spring. The areas are irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown, mottled, friable silt loam about 3 inches thick. The subsoil is about 48 inches thick. In the upper part it is grayish brown, mottled, firm silty clay loam. In the next part it is light brownish gray, mottled, firm silty clay loam. In the lower part it is gray, mottled, firm silt loam. In some places the surface layer is darker. In other places the subsoil has more clay. In some areas the lower part of the subsoil is more acid.

Included with this soil in mapping are small areas of the somewhat poorly drained Coulterville soils in the higher landscape positions and on the steeper side slopes. The included areas make up 10 to 15 percent of the map unit.

Water and air move through this Coulterville Variant soil at a very slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is between 0.5 foot above the surface to 2.0 feet below during spring. Available water capacity is moderate. Organic matter content is moderately low. Reaction in the subsoil is medium acid to moderately alkaline. After hard rains, a crust commonly forms on the surface. The shrink-swell potential is moderate. The potential for frost action is high. The content of sodium is high enough to adversely affect the growth of most crops.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of ponding.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table and the ponding can delay planting and reduce yields. Surface ditches help to

remove excess water. A conservation tillage system that leaves crop residue on the surface after planting helps to reduce puddling and crusting. The high content of sodium in the subsoil restricts the availability of water and interferes with the uptake of plant nutrients. During dry periods crops commonly show signs of stress because of the high sodium content. Soybean, grain sorghum, and wheat yields are less affected than corn yields.

If this soil is used for pasture, overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor soil tilth. Removing excess water with surface ditches helps to reduce winterkill and frost heave.

The land capability classification is IIIw.

7038B—Rocher loam, rarely flooded, 1 to 7 percent slopes. This is a gently sloping, somewhat excessively drained soil on low, undulating ridges on flood plains. It is subject to rare flooding. The areas are irregular in shape and range from 10 to 70 acres.

Typically, the surface soil is dark grayish brown, friable loam about 10 inches thick. The underlying material to a depth of 60 inches or more is stratified light brownish gray, dark brown, and grayish brown, very friable very fine sandy loam. In some places it has thin strata of silt loam, silty clay loam, silty clay, and clay loam. In other places the surface layer and the upper part of the underlying material are not calcareous. In many areas along old channels, slopes are short and steep.

Included with this soil in mapping are small areas of the poorly drained Ambraw soils in swales and depressions. The included areas make up 5 to 10 percent of the map unit.

Water and air move through this Rocher soil at a moderately rapid rate. In cultivated areas surface runoff is slow. Available water capacity is moderate. Organic matter content is low. Reaction in the underlying material is slightly acid to moderately alkaline. The shrink-swell potential is low. The potential for frost action is moderate.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops, pasture, and hay. It is generally not suited to use as a site for septic tank absorption fields and dwellings because of flooding.

If this soil is used for corn, soybeans, or small grain, the moderate available water capacity limits crop yields. Crops that are drought tolerant or that mature before the hot, dry part of summer are suitable. Leaving crop residue on the surface helps to conserve soil moisture by reducing the evaporation rate. The soil is suitable for irrigation. Ground water supplies are generally adequate for irrigation. Conservation practices, such as field windbreaks and crop residue management, help to control soil blowing.

If this soil is used for pasture and hay, droughtiness is a limitation. It can be overcome by irrigation systems. Seeding on the contour helps to control erosion. Allowing sufficient time for pasture plants to become established and preventing overgrazing help to maintain the pasture.

The land capability classification is IIe.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cropland, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber or is available for those uses. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimum inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at local offices of the Soil Conservation Service.

About 104,500 acres in Monroe County, or nearly 42 percent of the total acreage, meets the requirements for prime farmland. Associations 1, 2, 4, 7, and 8, which are described under the heading "General Soil Map Units," have the highest percentage of prime farmland, but this land is in scattered areas throughout the county. It is generally used for crops, mainly corn, soybeans, and wheat, which account for most of the local farm income.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in Monroe County that meet the requirements for prime farmland are listed in table 5.

This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all of those that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures. In Monroe County most of the naturally wet soils are adequately drained.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 169,000 acres in Monroe County is cropland, 2,800 acres is permanent pasture, and 36,000 acres is woodland. About 5,800 acres is water areas, such as ponds, lakes, and streams (*4*). The soils have good potential for increased production of crops, particularly corn, soybeans, and wheat.

The acreage used for soybeans and wheat has increased in recent years because of popular use of a rotation of wheat double cropped with soybeans. This rotation allows two cash crops to be harvested each year.

The demand for food and fiber has increased in recent years. As a result, some marginal land has been used for crops. Much of this land is more erodible than the more productive land. Another recent trend is an increase in the number of small residential tracts throughout the county. These tracts commonly are in areas of prime farmland. If these trends continue, they can result in a significant decline in the quality or quantity of the land used for food and fiber.

This soil survey can be used as a valuable guide to the latest management techniques that increase food and fiber production. The main management concerns on the cropland and pasture in the county are erosion, soil blowing, the seasonal high water table, soil fertility, soil tilth, and limited soil moisture supplies.

Soil erosion is a major problem on about 70 percent of the cropland and pasture in the county. It is a hazard where the slope is more than 2 percent or where the slope is more than 1 percent and runoff is concentrated.

Sheet erosion, or loss of the surface layer, is damaging for three reasons. First, the productivity of most soils is reduced if the surface layer is eroded away and the subsoil is incorporated into the plow layer. Second, severe erosion on sloping soils impairs tilth in the surface soil and reduces the rate of water intake. Erosion is especially damaging on soils that have a low organic matter content and tend to be cloddy if worked when too wet and to crust after hard rains. On these soils, preparing a good seedbed is difficult because of the cloddiness. If the surface is crusted, water infiltration

is reduced and runoff is increased. Third, uncontrolled erosion results in sedimentation of drainage ditches, streams, lakes, rivers, and road ditches. Removing the sediment is expensive. Management systems that control erosion also help to prevent sedimentation and improve surface water quality for municipal and recreation uses and for fish and wildlife.

Terraces, contour farming, and a conservation tillage system help to control erosion. They also increase the rate of water intake and reduce runoff. Terraces are most effective in areas where slopes are smooth and uniform. On many soils a conservation tillage system that leaves crop residue on the surface throughout the year, such as no-till, zero-till, or chisel-plant, significantly reduces the extent of erosion. No-till is most effective on moderately well drained and well drained soils. Till-plant or ridge-plant systems are more effective on somewhat poorly drained soils.

Soil blowing is a hazard in part of winter and early in spring. The hazard can be reduced by maintaining a plant cover, leaving crop residue on the surface throughout winter, or keeping the surface rough. Windbreaks of suitable trees or shrubs also are effective in controlling soil blowing.

Further information about measures that control erosion and soil blowing is provided in the Technical Guide, which is available in local offices of the Soil Conservation Service.

A drainage system has been installed on most of the somewhat poorly drained and poorly drained soils in the county. As a result, these soils are sufficiently drained for the crops commonly grown in the county. In some areas measures that maintain or improve the drainage system are needed. Some areas of the poorly drained Ambraw, Booker, and Fults soils have not been sufficiently drained for the crops commonly grown in the county.

The design of surface and subsurface drainage systems varies with the kind of soil. In many soils tile drains are inadequate. A combination of shallow surface drains and tile drains is needed in some areas of poorly drained soils. Tile drains are not effective in Marine, Rushville, and other slowly permeable soils unless surface inlets are used to drain wet spots. If suitable outlets are available, tile drains are adequate in moderately permeable and moderately slowly permeable soils.

Information about the drainage system suitable for each kind of soil is provided in the Technical Guide, which is available in local offices of the Soil Conservation Service.

A levee system has been installed along the Mississippi River to help protect the bottom lands called the Great American Bottoms from flooding. Many soils on the protected side of the levee, however, are flooded each year by runoff from surrounding areas. Several pumping stations have been installed to help overcome this problem.

Droughtiness limits yields on some of the soils used for crops and pasture in the county. Rocher soils, for example, are so porous that they are unable to store the water necessary to maintain adequate plant growth. Some soils, such as Marine, Okaw, and Rushville soils, have restrictive layers that plant roots cannot easily penetrate. These soils dry out quickly, and moisture stress is soon evident on hot, windy days. Other soils, such as Coulterville Variant soils, have a high content of sodium in the subsoil. The sodium results in poor physical properties that restrict the availability of water and interfere with the uptake of plant nutrients.

Droughtiness can be minimized by increasing the rate of water intake, reducing runoff, or planting crops that are drought tolerant. Cover crops and a system of conservation tillage that leaves crop residue on the surface after planting increase the rate of water intake and reduce runoff. Droughty soils generally are better suited to soybeans and grain sorghum than to corn. They also are better suited to winter wheat, which matures in spring.

Soil fertility is naturally medium to high in most of the soils in the county. Some soils, such as Marine, Rushville, and Okaw soils, however, are low in fertility and have low reaction in the subsoil. On these soils, applications of agricultural limestone raise the pH to a level high enough for optimum plant growth. Applications of lime are not needed on Haynie and Rocher soils, which generally have a high pH in the root zone.

Most of the soils in the county have a naturally low supply of nitrogen. Some crops, particularly corn and wheat, respond well to applications of nitrogen fertilizer. Planting legumes, which take nitrogen from the air, and adding livestock waste help to replenish the nitrogen supply.

Soil tilth is an important factor influencing the germination of seeds, the amount of runoff, and the intake of water into the soil. A surface soil that is in good tilth is granular and porous. Poor soil tilth is a problem on the severely eroded Blair soils; the dark, clayey Booker and Fults soils; and the poorly drained Ambraw soils. These soils often stay wet late in spring. If plowed when wet, they tend to be very cloddy. Preparing a good seedbed on these soils is difficult because of the cloddiness. Chisel plowing or tilling in fall generally results in good soil tilth in spring if crop residue is left on the surface.

The field crops suited to the soils and climate of the survey area include many that are not commonly grown. The main crops are corn, soybeans, and wheat. Grain sorghum, barley, and some specialty crops, such as strawberries and sweet corn, are also grown. Nursery stock is grown in a few areas. The county has several orchards. The climatic conditions and the soils are

particularly well suited not only to field crops but also to vegetables and specialty crops.

Suitable pasture and hay plants include several legumes, cool-season grasses, and warm-season, native grasses. Alfalfa and red clover are the common legumes grown for hay. They are also used in mixtures with bromegrass, orchardgrass, and fescue for hay and pasture. Suitable warm-season, native grasses include little bluestem, indiangrass, and switchgrass. These grasses grow well in summer. They require different management techniques for establishment and grazing than cool-season grasses.

Alfalfa is best suited to deep, moderately well drained and well drained soils on uplands, such as Alford, Hickory, Muren, and Seaton soils. The other legumes and grasses grow well on these soils and on the somewhat poorly drained soils on uplands. Blair and Marine are examples of soils that are suited to most pasture and hay plants. Poorly drained or very poorly drained soils, such as Beaucoup, Booker, Coulterville Variant, Okaw, and Rushville soils, are suitable for water-tolerant plants.

Well managed stands of forage species are effective in controlling erosion. The lack of adequate lime and fertilizer and overgrazing are common concerns. The amount of lime and fertilizer to be added should be based on the results of soil tests, the needs of the plants, and the expected level of yields.

Overgrazing reduces the vigor of pasture plants and forage production. It also results in an increase in the extent of weeds and brush. Measures that maintain soil fertility, deferred grazing, rotation grazing, and proper stocking rates prevent overgrazing. Deferred grazing rests the pasture, thus allowing the plants to build up reserves of carbohydrates. Rotation grazing among several areas of pasture allows each area a rest period. The information in table 6 can be helpful in estimating the number of animals that can be carried by a pasture.

Many soils in the survey area have a high water table in spring. Deferred grazing during wet periods helps to reduce surface compaction. Pasture renovation helps to overcome surface compaction where it is a concern. Frost heave of alfalfa and red clover is a hazard on soils that have a high water table. A cover of stubble 4 to 6 inches high during winter and grass-legume mixtures can help to reduce frost heave.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on experience and records. Farmers, conservationists, and the extension agent in Monroe County helped develop and closely reviewed local yield data. Available yield data from nearby counties and results of field trials and demonstrations were also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (*7*). Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclass indicated by *w*, because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Nearly all of Monroe County was originally woodland. Settlers cleared some of the forests for farms, homesites, and fuel. An increase in population and new farming technology during the latter part of the 19th century resulted in a large decline in the acreage of woodland. The demand for agricultural production during the 20th century and urban expansion have accelerated this decline. Much of the remaining woodland is in areas that are too steep or too wet for cultivation. The soils in these areas have fair to good potential for trees of high quality if the woodland is properly managed.

About 36,000 acres in the county, or 15 percent of the total acreage, is woodland (fig. 17). Most of the wooded areas are privately owned. The largest ones are in association 3, which is described in the section "General Soil Map Units." The main species are white oak, northern red oak, and shagbark hickory on uplands and eastern cottonwood and American sycamore on bottom lands.

Many of the stands can be improved by measures that thin out mature trees and remove undesirable species. Measures that exclude livestock, prevent fires, and control disease and insects also are needed.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 through 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil

Figure 17.—Native timber, dominantly oak and hickory, on Alford soils.

wetness can restrict equipment use, but the wet period does not to exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can

be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The demand for land and facilities for boating, swimming, picnicking, fishing, hunting, hiking, camping, and other forms of outdoor recreation is increasing throughout the county. Facilities for these activities are available on a few privately owned tracts.

The potential for further recreational development is favorable throughout the county. The soils having the best potential are along the Kaskaskia and Mississippi Rivers. The large areas of karst topography and the large areas of steep slopes along the bluffs provide a natural setting for the establishment of paths and trails, camp areas, and picnic areas.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, milo, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are redtop, orchardgrass, lespedeza, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, beggarweed, indiangrass, and sunflower.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, hackberry, hawthorn, dogwood, hickory, blackberry, and spicebush. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn-olive, and crabapple.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, buttonbush, cordgrass, cattails, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow

water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, kestrel, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

In the following paragraphs the soil associations in Monroe County, described under the heading "General Soil Map Units," are grouped into two wildlife areas. Important plants and animals common in the two areas are specified.

Wildlife Area 1 occurs as the Muren-Alford, Alford, Blair-Marine, Coulterville-Coulterville Variant, and Seaton-Hickory-Eden associations. These associations consist of well drained to poorly drained soils on uplands. This wildlife area includes steep limestone bluffs and gently sloping areas in the uplands. The native plant communities on these associations generally are oak-hickory forests consisting of several species of oak, hickory, and other hardwood trees.

The somewhat excessively drained, moderately permeable Hamburg soils on the west-facing slopes near the crest of the Mississippi River bluffs characteristically support a variety of prairie plants, mainly little bluestem and sideoats grama. These soils also support eastern redcedar and a few other woody plants in some coves or drainageways, but they generally are too droughty for trees and shrubs.

Wildlife common to this area include such woodland wildlife as gray squirrel, gray fox, white-tailed deer, and woodpeckers. The clearing of more than three-fourths of the woodland since settlement has changed the habitat conditions. The habitat currently favors openland and edge-associated wildlife species, such as red fox, coyote, bobwhite, cottontail, and meadowlark.

The hilly prairies and bluffs provide habitat for several rare species. The corn snake, coachwhip snake, and western hognose snake live in these habitats. These species are on the Illinois list of threatened wildlife. They are not abundant because their respective habitats are restricted.

The turkey vulture also inhabits this area. Although it soars over large areas, its nesting and roosting sites are concentrated on the steep bluffs generally mapped as Lacrescent soils.

Wildlife Area 2 occurs as the Fults-Ambraw-Riley, Ambraw-Haynie, Colp-Hurst-Okaw, and Wakeland-Wilbur-Birds associations. The soils in these associations are nearly level to sloping and are poorly drained to moderately well drained. They are on flood plains and terraces. The typical native vegetation includes silver maple, pin oak, sweetgum, ash, river birch, cottonwood, willow, and sycamore. The Ambraw-Haynie association, however, which is on the unprotected flood plains along the Mississippi River and is subject to frequent flooding, typically does not support the hardwoods characteristic of bottom lands because of frequent alluvial depositions. The native forests in much of this wildlife area have been cleared to make way for row crops.

Wildlife common to this area include beaver, muskrat, wood ducks, raccoon, gray squirrel, and pileated woodpeckers. In addition, the Mississippi River is a major flyway for many migrating birds. The best known of these are waterfowl, which find food and cover in crop fields or in areas of wetland plants or hardwoods. Less conspicuous, but ecologically very significant, is the annual migration of thousands of songbirds and shore birds along this flyway. All these species are dependent, at least to some extent, on food and cover available all along the migration route.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required (*9*).

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent. Large stones interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during the wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the

surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The

limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection. If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5

percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops.

They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clay loams that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that

delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*8*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning stratified, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*6*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*8*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alford Series

The Alford series consists of well drained, moderately permeable soils that formed in loess. These soils are on ridgetops and side slopes in the uplands and in areas of karst topography. Slope ranges from 2 to 55 percent.

Alford soils are similar to Hickory, Seaton, and Westmore soils and commonly are adjacent to Hickory, Muren, and Seaton soils. Hickory soils formed in glacial till on steep side slopes. Muren soils are in landscape positions similar to those of the Alford soils. They are mottled in the upper part of the subsoil. Seaton soils have less clay in the subsoil than the Alford soil. They

are on the steeper side slopes. Westmore soils formed in loess and in material weathered from sandstone and shale.

Typical pedon of Alford silt loam, 2 to 5 percent slopes, 200 feet north and 4,520 feet east of the southwest corner of sec. 26, T. 1 S., R. 10 W.:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 17 inches; dark brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—17 to 23 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—23 to 31 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few faint dark brown (7.5YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt4—31 to 40 inches; dark brown (7.5YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt5—40 to 51 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

C—51 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few dark brown (7.5YR 4/4) channel fillings; medium acid.

The solum ranges from 40 to 60 inches in thickness. The Ap horizon has chroma of 2 or 3. Some pedons have a thin A1 horizon, which has value of 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. It ranges from very strongly acid to slightly acid.

Ambraw Series

The Ambraw series consists of poorly drained, moderately permeable soils on flood plains. These soils formed in stratified, loamy sediments. Slope ranges from 0 to 2 percent.

Ambraw soils are similar to Beaucoup and Fults soils and commonly are adjacent to Fults, Landes, and Riley soils. Beaucoup soils have less sand in the solum than the Ambraw soils. Fults soils are in landscape positions similar to those of the Ambraw soils. They have more clay in the upper part of the solum than the Ambraw soils. The well drained Landes soils are on ridges. They have more sand than the Ambraw soils. The somewhat poorly drained Riley soils are in the higher positions on the landscape.

Typical pedon of Ambraw silty clay loam, 2,000 feet northwest of field lane and 150 feet northeast of railroad tracks, approximately 2 miles southeast of Fults, T. 4 S., R. 10 W.:

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bg1—11 to 15 inches; dark gray (10YR 4/1) clay loam; common fine prominent dark brown (7.5YR 3/4) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few fine roots; neutral; clear smooth boundary.

Bg2—15 to 21 inches; dark gray (10YR 4/1) sandy clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; neutral; clear smooth boundary.

Bg3—21 to 25 inches; gray (10YR 5/1) clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg4—25 to 34 inches; gray (10YR 5/1) sandy clay loam; common fine prominent strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; very friable; few very fine roots; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

BCg—34 to 42 inches; dark grayish brown (10YR 4/2) sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; very friable; few very fine roots; neutral; clear smooth boundary.

Cg1—42 to 54 inches; gray (10YR 5/1) loam; many large distinct yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; very friable; few very fine roots; neutral; clear smooth boundary.

Cg2—54 to 60 inches; gray (10YR 5/1) silt loam; common fine distinct yellowish brown (10YR 5/8)

mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; neutral.

The solum ranges from 40 to 50 inches in thickness. The mollic epipedon ranges from 10 to 18 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is typically silty clay loam or loam, but the range includes clay loam. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is strongly acid to neutral. In some pedons it has strata of loam, sandy loam, or silty clay loam. The C horizon is stratified loamy sand, sandy loam, loam, or silt loam. It has value of 5 or 6 and chroma of 1 or 2.

In map units 3302 and 1302, the profile is more stratified and commonly has less sand or is less acid in the control section than is definitive for the Ambraw series. These differences do not significantly affect the use or behavior of the soils.

Arenzville Series

The Arenzville series consists of well drained, moderately permeable soils on flood plains. These soils formed in silty alluvium on alluvial fans on bottom lands called the Great American Bottoms. Slope ranges from 0 to 2 percent.

Arenzville soils commonly are adjacent to Drury, Dupo, Wakeland, and Wilbur soils. Drury soils are on foot slopes. The somewhat poorly drained Dupo and Wakeland and moderately well drained Wilbur soils are in the lower positions on the landscape. Dupo soils are underlain by silty clay alluvium. Drury, Wakeland, and Wilbur soils do not have buried soil horizons.

Typical pedon of Arenzville silt loam, 240 feet west of Bluff Road and 640 feet south of KK road in parcel S. 700, C. 494, T. 3 S., R. 11 W.:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; friable; common fine roots; slightly acid; clear smooth boundary.

C1—10 to 19 inches; dark brown (10YR 4/3) silt loam; weak very fine angular blocky structure; friable; few fine roots; few fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

C2—19 to 27 inches; dark brown (10YR 4/3) silt loam; common fine faint brown (10YR 5/3) mottles; weak very fine subangular blocky structure; friable; few fine roots; few fine rounded accumulations (iron and manganese oxides); few fine light brownish gray (10YR 6/2) splotches; neutral; clear smooth boundary.

Ab1—27 to 31 inches; very dark gray (10YR 3/1) silt loam; weak fine subangular blocky structure; friable; few fine roots; few fine dark brown (10YR 4/3) splotches; neutral; clear smooth boundary.

Ab2—31 to 37 inches; very dark gray (10YR 3/1) silt loam; weak fine subangular blocky structure; friable; few fine roots; neutral; clear smooth boundary.

Ab3—37 to 44 inches; dark brown (10YR 3/3) silt loam; few fine faint grayish brown (10YR 5/2) mottles; weak very fine subangular blocky structure; friable; common fine very dark gray (10YR 3/1) organic coatings lining pores and channels; neutral; clear smooth boundary.

C'—44 to 60 inches; dark brown (10YR 4/3) silt loam; common fine faint grayish brown (10YR 5/2) and few fine distinct dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; mildly alkaline.

The thickness of the light colored A and C horizons and depth to the Ab horizon range from 20 to 40 inches. Reaction is medium acid to mildly alkaline throughout the profile.

In some pedons the A horizon has strata that have value of 3 or 4 and chroma of 1 to 3. In some pedons the upper part of the C horizon has strata that have value of 2 or 3 and chroma of 4 or 5. The buried dark horizon is silt loam or silty clay loam.

Atlas Series

The Atlas series consists of somewhat poorly drained, very slowly permeable soils on dissected till plains. These soils formed in a thin layer of loess and the underlying glacial till. Slope ranges from 10 to 20 percent.

Atlas soils are similar to Blair soils and commonly are adjacent to Blair, Muren, and Ursa soils. Blair soils are in landscape positions similar to those of the Atlas soils and are at the higher elevations on the upper part of drainageways. The moderately well drained Muren soils are fine-silty and formed entirely in loess. They are on ridges and in the less sloping areas. The well drained Ursa soils are on the steeper slopes.

Typical pedon of Atlas silty clay loam, 10 to 15 percent slopes, severely eroded, 820 feet west and 400 feet south of the northeast corner of sec. 26, T. 2 S., R. 9 W.:

Ap—0 to 9 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

2Bt1—9 to 21 inches; yellowish brown (10YR 5/4) silty clay loam; many medium faint grayish brown (10YR 5/2) and common fine prominent yellowish red (5YR 5/6) mottles; weak fine prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; few faint brown (10YR 5/3) clay films on faces of peds; few fine dark accumulations (iron and

manganese oxides); few fine pebbles; medium acid; clear smooth boundary.

2Bt2—21 to 31 inches; mottled gray (10YR 6/1) and yellowish brown (10YR 5/6) silty clay loam; moderate fine prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); few fine pebbles; slightly acid; clear smooth boundary.

2Bt3—31 to 41 inches; gray (10YR 6/1) silty clay; many large prominent strong brown (7.5YR 5/6) and few medium prominent reddish brown (5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); few fine pebbles; neutral; clear smooth boundary.

2Bt4—41 to 51 inches; gray (10YR 6/1) silty clay; many large prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; few distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); common fine pebbles; mildly alkaline; clear smooth boundary.

2Bt5—51 to 60 inches; gray (10YR 6/1) silty clay; many large prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium angular blocky; firm; few distinct gray (10YR 5/1) clay films on faces of peds; many large concretions (iron and manganese oxides); common fine pebbles; mildly alkaline.

The solum ranges from 50 to 60 inches in thickness. The A horizon has value of 4 or 5 and chroma of 2 or 3. It is silt loam or silty clay loam. The Bt horizon is silty clay loam, clay loam, silty clay, or clay. It has value of 4 to 6 and chroma of 1 to 4. It ranges from very strongly acid to mildly alkaline.

Banlic Series

The Banlic series consists of somewhat poorly drained, slowly permeable soils on very low terraces along streams and drainageways on uplands. These soils formed in silty sediments from nearby side slopes. Slope ranges from 0 to 2 percent.

The Banlic soils mapped in Monroe County average more than 18 percent clay in the control section. This characteristic is outside the range of the Banlic series, but it does not significantly affect the use or behavior of the soils.

Banlic soils are similar to Wakeland soils and commonly are adjacent to Wakeland and Wilbur soils. Wakeland and Wilbur soils do not have a Bx horizon. Wakeland soils are lower lying than the Banlic soils and are closer to the drainageways and streams. The moderately well drained Wilbur soils are in the higher positions farther from the drainageways and streams.

Typical pedon of Banlic silt loam, 240 feet west and 460 feet north of the center of sec. 9, T. 1 S., R. 10 W.:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine roots; medium acid; abrupt smooth boundary.

E—10 to 14 inches; grayish brown (10YR 5/2) silt loam, very pale brown (10YR 7/3) dry; common fine prominent brown (7.5YR 4/4) mottles; weak medium angular blocky structure; friable; few fine roots; medium acid; clear smooth boundary.

Bw1—14 to 18 inches; grayish brown (10YR 5/2) silt loam; many medium prominent brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to weak medium angular blocky; friable; few fine roots; medium acid; clear smooth boundary.

Bw2—18 to 25 inches; grayish brown (10YR 5/2) silt loam; many medium prominent brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; few prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bw3—25 to 33 inches; grayish brown (10YR 5/2) silt loam; many medium prominent brown (7.5YR 4/4) and common fine prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; common prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bx1—33 to 42 inches; grayish brown (10YR 5/2) silt loam; common fine prominent reddish brown (5YR 4/4) and common fine prominent yellowish red (5YR 4/6) mottles; weak medium prismatic structure; firm; many prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bx2—42 to 55 inches; grayish brown (10YR 5/2) silt loam; many fine prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to weak medium angular blocky; firm; many prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bx3—55 to 60 inches; grayish brown (10YR 5/2) silt loam; many medium prominent brown (7.5YR 4/4) and few fine prominent reddish brown (5YR 4/4)

mottles; weak medium prismatic structure parting to weak medium angular blocky; firm; few prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid.

The solum ranges from 45 to 60 inches in thickness. The depth to the Bx horizon ranges from 20 to 35 inches.

The Ap horizon has value of 4 or 5. The E horizon has value of 5 or 6 and chroma of 2 or 3. The Bw horizon has value of 5 or 6 and chroma of 2 to 4. The Bw and Bx horizons range from very strongly acid to neutral.

Beaucoup Series

The Beaucoup series consists of poorly drained, moderately slowly permeable soils on flood plains. These soils formed in silty clay loam alluvium. Slope ranges from 0 to 2 percent.

Beaucoup soils are similar to Ambraw soils and commonly are adjacent to Booker, Fults, and Riley soils. Ambraw soils have more sand in the solum than the Beaucoup soils. Booker soils have more clay throughout than the Beaucoup soils. Fults soils have more clay in the upper part and more sand in the lower part than the Beaucoup soils. The somewhat poorly drained Riley soils are in the higher landscape positions. They have more sand in the solum than the Beaucoup soils.

Typical pedon of Beaucoup silty clay loam, 2,120 feet west and 2,140 feet south of the northeast corner of sec. 17, T. 2 S., R. 11 W.:

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

AB—11 to 16 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate fine angular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

Bg1—16 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine prominent reddish brown (5YR 4/4) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; friable; few fine roots; few faint very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; mildly alkaline; clear smooth boundary.

Bg2—24 to 35 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine prominent dark red (2.5YR 3/6) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; friable; few very fine roots; continuous faint very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; thin band of dark grayish brown (2.5Y 4/2) silt coatings, light brownish gray (2.5Y 6/2) dry, at 32 inches; mildly alkaline; clear smooth boundary.

Bg3—35 to 46 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common medium prominent brown (7.5YR 4/4) and few fine prominent dark red (2.5YR 3/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; many faint very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; mildly alkaline; clear smooth boundary.

BC—46 to 60 inches; stratified yellowish brown (10YR 5/6) and gray (10YR 5/1) silty clay loam; few medium prominent reddish brown (5YR 4/3) mottles; moderate medium prismatic structure; friable; common faint dark grayish brown (2.5Y 4/2) organic coatings on faces of peds; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The mollic epipedon is 10 to 18 inches thick. Reaction is medium acid to mildly alkaline throughout the profile.

The A horizon has value of 2 or 3. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value 4 to 6, and chroma of 0 to 2. Some pedons have a C horizon, which has strata of silt loam, loam, very fine sandy loam, or silty clay loam.

Birds Series

The Birds series consists of poorly drained, moderately slowly permeable soils on flood plains. These soils formed in silty sediments along the major streams. Slope ranges from 0 to 2 percent.

Birds soils are similar to Okaw soils and commonly are adjacent to Hurst, Okaw, and Wakeland soils. The somewhat poorly drained Hurst and Okaw soils formed in clayey lacustrine sediments and are in the slightly higher positions on terraces. The somewhat poorly drained Wakeland soils are in the slightly higher positions on flood plains.

Typical pedon of Birds silt loam, 1,980 feet north and 910 feet east of the southwest corner of sec. 7, T. 3 S., R. 7 W.:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium granular structure; friable; common fine roots; medium acid; clear smooth boundary.

A2—4 to 9 inches; dark grayish brown (10YR 4/2) silt loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable; few fine roots; many faint dark gray (10YR 4/1) organic coatings on faces of peds; medium acid; gradual smooth boundary.

A3—9 to 18 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint gray (10YR 5/1) and common medium prominent strong brown (7.5YR 4/6)

mottles; weak fine subangular blocky structure; friable; few fine roots; many faint dark gray (10YR 4/1) organic coatings on faces of peds; medium acid; gradual smooth boundary.

Cg1—18 to 28 inches; gray (10YR 5/1) silt loam; common medium prominent strong brown (7.5YR 4/6) mottles; massive; friable; few fine roots; medium acid; gradual smooth boundary.

Cg2—28 to 36 inches; gray (10YR 5/1) silt loam; few medium prominent yellowish red (5YR 4/6) mottles; massive; friable; few fine roots; few fine dark accumulations (iron and manganese oxides); medium acid; gradual smooth boundary.

Cg3—36 to 60 inches; gray (10YR 5/1) stratified silt loam and silty clay loam; few medium prominent strong brown (7.5YR 4/6) mottles; massive; friable; few fine roots; few fine dark accumulations (iron and manganese oxides); medium acid.

The A horizon has value of 4 or 5 and chroma of 1 or 2. The Cg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is dominantly silt loam, but some pedons have thin strata of silty clay loam, clay loam, loam, or sandy loam. It ranges from medium acid to mildly alkaline in the upper part and from strongly acid to mildly alkaline in the lower part.

Blair Series

The Blair series consists of somewhat poorly drained, moderately slowly permeable soils on upland side slopes. These soils formed in silty, water-worked sediments. Slope ranges from 5 to 15 percent.

Blair soils are similar to Atlas and Muren soils and commonly are adjacent to Atlas, Marine, and Muren soils. Atlas soils are on the lower parts of drainageways. They have more clay in the subsoil than the Blair soils. Marine soils are on ridges and in the less sloping areas. They have more clay in the subsoil than the Blair soils. The moderately well drained Muren soils are on ridges and the upper end of drainageways. Marine and Muren soils formed entirely in loess.

Typical pedon of Blair silty clay loam, 5 to 10 percent slopes, severely eroded, 180 feet east and 1,760 feet north of the southwest corner of sec. 2, T. 3 S., R. 9 W.:

Ap—0 to 5 inches; brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; moderate fine granular structure; friable; few very fine roots; strongly acid; abrupt smooth boundary.

Bt1—5 to 9 inches; brown (10YR 5/3) silty clay loam; many fine prominent strong brown (7.5YR 4/6) and few fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few very fine roots; strongly acid; clear smooth boundary.

Bt2—9 to 14 inches; brown (10YR 5/3) silt loam; many fine prominent strong brown (7.5YR 4/6) and common fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—14 to 20 inches; gray (10YR 6/1) silt loam; many fine prominent strong brown (7.5YR 4/6) and few fine prominent dark brown (7.5YR 3/4) mottles; moderate medium subangular blocky structure; firm; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt4—20 to 27 inches; gray (10YR 6/1) silt loam; few fine prominent dark brown (7.5YR 3/4) and strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt5—27 to 38 inches; gray (10YR 6/1) silt loam; common fine prominent strong brown (7.5YR 4/6) and few fine prominent dark brown (7.5YR 3/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; common fine dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bt6—38 to 49 inches; gray (10YR 6/1) silt loam; common fine prominent strong brown (7.5YR 5/6), few fine prominent dark brown (7.5YR 3/4), and few fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few faint grayish brown (10YR 5/2) clay films on faces of peds; many fine dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

BC—49 to 60 inches; gray (10YR 6/1) silt loam; few fine prominent dark brown (7.5YR 3/4 and 4/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few faint grayish brown (10YR 5/2) clay films on vertical faces of peds; few fine dark concretions (iron and manganese oxides); mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The A horizon has value of 4 or 5 and chroma of 3 or 4. It is silty clay loam or silt loam. The Bt horizon is silt loam or silty clay loam. It has value of 5 or 6 and chroma of 1 to 3. It ranges from very strongly acid to medium acid in the upper part and from strongly acid to mildly alkaline in the lower part.

Booker Series

The Booker series consists of very poorly drained, very slowly permeable soils on flood plains along the major rivers. These soils formed in fine textured, slack-water sediments. Slope ranges from 0 to 2 percent.

Booker soils commonly are adjacent to Ambraw, Beaucoup, Fults, and Nameoki soils. Ambraw soils are fine-loamy. They are in the higher landscape positions. Beaucoup soils are fine-silty. Fults and Nameoki soils are underlain by sandy alluvium at a depth of about 40 inches. The somewhat poorly drained Nameoki soils are in the higher landscape positions.

Typical pedon of Booker clay, 5,100 feet southeast, along railroad tracks, of the intersection of Kaskaskia Road and railroad tracks and 2,100 feet southwest of railroad tracks, approximately 5,675 feet southeast of Kidd in T. 5 S., R. 10 W.:

Ap—0 to 8 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; very firm; common medium roots; neutral; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; weak medium prismatic structure parting to moderate fine angular blocky; very firm; common fine roots; common very dark gray (5Y 3/1) slickensides; neutral; clear smooth boundary.

Bg1—13 to 21 inches; olive gray (5Y 4/2) clay; few fine prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; common very fine roots; many dark gray (5Y 4/1) slickensides; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bg2—21 to 31 inches; gray (5Y 5/1) clay; few medium prominent yellowish red (5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; common very fine roots; many dark gray (5Y 4/1) slickensides; neutral; gradual smooth boundary.

Bg3—31 to 43 inches; gray (5Y 5/1) clay; common medium prominent yellowish red (5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; few very fine roots; common dark gray (5Y 4/1) slickensides; neutral; gradual smooth boundary.

Bg4—43 to 52 inches; dark grayish brown (2.5Y 4/2) clay; common medium prominent brown (7.5YR 4/4) and few fine prominent yellowish red (5YR 4/6) mottles; moderate medium prismatic structure parting to moderate coarse angular blocky; very firm; few very fine roots; common dark gray (5Y 4/1) slickensides; neutral; gradual smooth boundary.

BCg—52 to 60 inches; olive gray (5Y 4/2) clay; few medium prominent dark red (2.5YR 3/6) and few medium prominent brown (7.5YR 4/4) mottles; weak medium prismatic structure; very firm; few very fine roots; few dark gray (5Y 4/1) slickensides; neutral.

The mollic epipedon ranges from 10 to 18 inches in thickness. The solum ranges from 50 to 60 inches in thickness. Reaction ranges from medium acid to neutral throughout the profile.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly clay, but the range includes silty clay. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2.

Colp Series

The Colp series consists of moderately well drained, slowly permeable soils on terraces along the major streams. These soils formed in a thin mantle of loess and fine textured, acid lacustrine sediments. Slope ranges from 0 to 12 percent.

Colp soils are similar to Muren soils and commonly are adjacent to Hurst and Okaw soils. Muren soils formed entirely in loess on uplands. They are fine-silty. The somewhat poorly drained Hurst and poorly drained Okaw soils are in the lower positions on the landscape.

Typical pedon of Colp silt loam, 1 to 5 percent slopes, 1,095 feet east and 110 feet north of the center of sec. 27, T. 3 S., R. 8 W.:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common very fine roots; few fine dark concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

E—8 to 12 inches; light brownish gray (10YR 6/2) silt loam, white (10YR 8/2) dry; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure parting to moderate fine granular; friable; few very fine roots; few fine dark concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

2Bt1—12 to 17 inches; yellowish brown (10YR 5/4) silty clay; few faint yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; many faint brown (10YR 5/3) clay films on faces of peds; common prominent white (10YR 8/2) dry silt coatings on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Bt2—17 to 23 inches; yellowish brown (10YR 5/4) silty clay; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; few very fine roots; many faint brown (10YR 5/3) clay films on faces of peds; few fine dark

concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Bt3—23 to 30 inches; yellowish brown (10YR 5/4) silty clay; few fine distinct strong brown (7.5YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; few very fine roots; common faint brown (10YR 5/3) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Bt4—30 to 37 inches; yellowish brown (10YR 5/4) clay; common fine distinct strong brown (7.5YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; few very fine roots; common faint brown (10YR 5/3) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Bt5—37 to 48 inches; brown (10YR 5/3) silty clay loam; many medium prominent strong brown (7.5YR 5/6) and common medium faint light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

2Btg—48 to 55 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; many medium dark accumulations (iron and manganese oxides) on vertical faces of peds; medium acid; abrupt smooth boundary.

2BCg—55 to 60 inches; light brownish gray (2.5Y 6/2) silty clay; common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); medium acid.

The solum ranges from 40 to 60 inches in thickness. Eroded areas have no loess. In uneroded areas the loess is as much as 20 inches thick.

The A horizon has value of 4 or 5 and chroma of 2 to 4. It is silt loam or silty clay loam. The E horizon has value of 5 or 6 and chroma of 2 or 3. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 5. It is silty clay, silty clay loam, or clay. Some pedons have thin strata of silt loam in the lower part.

Coulterville Series

The Coulterville series consists of somewhat poorly drained, slowly permeable soils on upland ridges and side slopes. These soils formed in loess. Slope ranges from 2 to 10 percent.

Coulterville soils are similar to Marine soils and commonly are adjacent to Coulterville Variant and Marine soils. The poorly drained Coulterville Variant soils are in depressions and the lower positions on the landscape. They have more clay in the subsoil than the Coulterville soils. Marine soils have more clay in the subsoil than the Coulterville soils and have a strongly acid subsoil. They are in landscape positions similar to those of the Coulterville soils.

Typical pedon of Coulterville silt loam, 2 to 5 percent slopes, eroded, 1,320 feet west and 2,100 feet north of the southeast corner of sec. 5, T. 3 S., R. 8 W.:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few fine roots; few fine brown (10YR 4/3) subsoil fragments; medium acid; abrupt smooth boundary.

Bt—7 to 11 inches; brown (10YR 4/3) silty clay loam; common medium prominent strong brown (7.5YR 4/6) and few fine distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations (iron and manganese oxides); about 5 percent exchangeable sodium; neutral; clear smooth boundary.

Btg1—11 to 15 inches; gray (5Y 6/1) silty clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations (iron and manganese oxides); about 9 percent exchangeable sodium; neutral; clear smooth boundary.

Btg2—15 to 23 inches; gray (5Y 6/1) silty clay loam; common medium prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; common distinct grayish brown (10YR 5/2) clay films and common faint light gray (10YR 7/1) silt coatings on faces of peds; few fine accumulations (iron and manganese oxides); very dark grayish brown (10YR 3/2) vertical krotovinas; about 12 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

Btg3—23 to 28 inches; gray (5Y 5/1) silt loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; few faint grayish brown (10YR 5/2)

clay films on faces of peds; few fine accumulations (iron and manganese oxides); about 14 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

Btg4—28 to 33 inches; light olive gray (5Y 6/2) silt loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few faint grayish brown (10YR 5/2) clay films and common faint light gray (10YR 7/1) silt coatings on faces of peds; few fine accumulations (iron and manganese oxides); about 10 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

B't—33 to 39 inches; olive (5Y 5/3) silt loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few faint grayish brown (10YR 5/2) clay films on faces of peds; many medium accumulations (iron and manganese oxides); about 8 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

BC—39 to 56 inches; brown (10YR 5/3) silt loam; common medium prominent strong brown (7.5YR 4.6) mottles; weak medium subangular blocky structure; friable; few fine accumulations (iron and manganese oxides); about 6 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

C—56 to 60 inches; brown (10YR 5/3) silt loam; common medium prominent strong brown (7.5YR 4/6) and yellowish brown (10YR 5/6) mottles; massive; friable; few fine accumulations (iron and manganese oxides); about 5 percent exchangeable sodium; moderately alkaline.

The solum ranges from 36 to 60 inches in thickness. The depth to horizons that have significant amounts of sodium ranges from 10 to 40 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. It is dominantly silt loam but in eroded pedons is silty clay loam. The Bt horizon has hue of 10YR, 5Y, or 2.5Y, value of 4 to 6, and chroma of 1 to 4. The C horizon has value of 4 to 6 and chroma of 1 to 3.

Coulterville Variant

The Coulterville Variant consists of poorly drained, very slowly permeable soils on loess-covered till plains. These soils are on broad upland flats. Slope ranges from 0 to 2 percent.

Coulterville Variant soils are similar to Rushville soils and commonly are adjacent to Coulterville and Marine soils. The somewhat poorly drained Coulterville and Marine soils are at the slightly higher elevations. Marine and Rushville soils have more clay in the subsoil than the Coulterville Variant soils.

Typical pedon of Coulterville Variant silt loam, 204 feet west and 312 feet south of the center of sec. 4, T. 3 S., R. 8 W.:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; few fine prominent dark brown (7.5YR 4/4) mottles; moderate fine granular structure; friable; few very fine roots; neutral; abrupt smooth boundary.

E—9 to 12 inches; grayish brown (10YR 5/2) silt loam; few fine prominent dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure parting to weak fine granular; friable; few very fine roots; many distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; common fine round accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

Btg1—12 to 16 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent strong brown (7.5YR 4/6) and few fine prominent yellowish red (5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings and common faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine round accumulations (iron and manganese oxides); about 5 percent exchangeable sodium; mildly alkaline; clear smooth boundary.

Btg2—16 to 29 inches; light brownish gray (10YR 6/2) silty clay loam; common fine prominent yellowish red (5YR 4/6) and common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; few faint grayish brown (2.5Y 5/2) clay films on faces of peds; few fine round accumulations (iron and manganese oxides); about 7 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

Btg3—29 to 39 inches; light brownish gray (10YR 6/2) silty clay loam; common fine prominent yellowish red (5YR 4/6) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; many coarse irregular accumulations (iron and manganese oxides); about 8 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

Btg4—39 to 50 inches; gray (10YR 6/1) silt loam; many fine prominent yellowish red (5YR 4/6) and common fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; many coarse irregular accumulations (iron and manganese oxides); about 6 percent exchangeable sodium; moderately alkaline; clear smooth boundary.

BCg—50 to 60 inches; gray (10YR 6/1) silt loam; common fine prominent yellowish red (5YR 4/6) and

common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; few fine round accumulations (iron and manganese oxides); about 6 percent exchangeable sodium; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 1 or 2. The E horizon has value of 4 or 5. The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam, silty clay, or silt loam.

Drury Series

The Drury series consists of well drained, moderately permeable soils on foot slopes. These soils formed in silty alluvium from the adjacent uplands. Slope ranges from 2 to 30 percent.

Drury soils commonly are adjacent to Seaton and Wilbur soils. Seaton soils formed in loess and are on the steeper side slopes. They have more clay in the subsoil than the Drury soils. The moderately well drained Wilbur soils are in the lower, more nearly level areas on flood plains.

Typical pedon of Drury silt loam, 2 to 5 percent slopes, 2,380 feet southeast of intersection of Bluff Road and railroad crossing and 820 feet northeast of railroad tracks, parcel S. 701, C. 495, T. 3 S., R. 11 W.:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Bw1—7 to 12 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; few fine roots; many faint dark brown (10YR 4/3) coatings on faces of peds; neutral; clear smooth boundary.

Bw2—12 to 19 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; few fine roots; common faint dark brown (10YR 4/3) coatings on faces of peds; neutral; gradual smooth boundary.

Bw3—19 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common faint dark brown (10YR 4/3) coatings on faces of peds; neutral; gradual smooth boundary.

Bw4—26 to 36 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; few faint dark brown (10YR 4/3) coatings on faces of peds; neutral; gradual smooth boundary.

Bw5—36 to 43 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few faint dark brown (10YR 4/3) coatings on faces of peds; neutral; gradual smooth boundary.

C—43 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; neutral.

The solum ranges from 30 to 45 inches in thickness. The A horizon has chroma of 2 to 4. The B horizon has value of 4 or 5 and chroma of 3 to 5. It ranges from medium acid to mildly alkaline.

Dupo Series

The Dupo series consists of somewhat poorly drained soils on flood plains. These soils are moderately permeable in the upper part and slowly permeable in the lower part. They formed in recent, light colored, silty alluvium overlying dark colored, clayey or silty alluvium. Slope ranges from 0 to 2 percent.

Dupo soils are similar to Wakeland soils and commonly are adjacent to Fults and Wakeland soils. The poorly drained Fults soils formed in fine textured, slack-water sediments and in the underlying loamy and sandy sediments. Wakeland soils formed entirely in silty sediments.

Typical pedon of Dupo silt loam, approximately 1,800 feet east and 750 feet north of intersection of railroad tracks and drainage ditch, sec. 17, T. 1 S., R. 10 W.:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

A—9 to 16 inches; dark brown (10YR 4/3) silt loam; few fine prominent strong brown (7.5YR 4/6) mottles; moderate fine granular structure; friable; few fine roots; many faint dark yellowish brown (10YR 4/4) coatings on faces of peds; neutral; clear smooth boundary.

C1—16 to 20 inches; dark brown (10YR 4/3) silt loam; common fine faint grayish brown (10YR 5/2) and few fine prominent strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few fine roots; common faint dark grayish brown (10YR 4/2) accumulations (iron and manganese oxides) in voids; neutral; clear smooth boundary.

C2—20 to 26 inches; dark brown (10YR 4/3) silt loam; common fine faint grayish brown (10YR 5/2) and few fine prominent strong brown (7.5YR 4/6) mottles; massive; friable; few fine roots; few faint dark grayish brown (10YR 4/2) accumulations (iron and manganese oxides) in voids; neutral; clear smooth boundary.

C3—26 to 34 inches; dark brown (10YR 4/3) silt loam; few fine distinct gray (10YR 5/1) and few fine

prominent strong brown (7.5YR 4/6) mottles; massive; friable; few fine roots; common faint dark grayish brown (10YR 4/2) accumulations (iron and manganese oxides) in voids; neutral; abrupt smooth boundary.

2Ab1—34 to 43 inches; very dark gray (10YR 3/1) silty clay; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few fine roots; few slickensides; dark brown (10YR 4/3) fillings in cracks; neutral; clear smooth boundary.

2Ab2—43 to 52 inches; very dark gray (10YR 3/1) silty clay; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few fine roots; common slickensides; neutral; clear smooth boundary.

2Ab3—52 to 60 inches; very dark gray (10YR 3/1) silty clay; common fine prominent dark brown (7.5YR 4/4) and common medium distinct brown (10YR 4/3) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common slickensides; neutral.

The depth to the 2Ab horizon ranges from 20 to 40 inches. The A horizon is 6 to 18 inches thick. It has value of 3 to 5 and chroma of 1 to 3. The C horizon has value of 3 to 6 and chroma of 1 to 3. It is dominantly silt loam, but in some pedons it has strata of loam and fine sandy loam. It ranges from medium acid to moderately alkaline. The 2Ab horizon has value of 2 or 3 and chroma of 1 or 2. It is silty clay or silty clay loam.

Eden Series

The Eden series consists of well drained, slowly permeable soils on upland side slopes. These soils formed in a thin loess mantle and in material weathered from the underlying limestone. Slope ranges from 20 to 30 percent.

The Eden soils mapped in Monroe County have a higher content of coarse fragments in the Bt horizon than is definitive for the Eden series and have a browner Bt horizon. These characteristics do not significantly affect the use or behavior of the soils.

Eden soils are similar to Neotoma soils and commonly are adjacent to Seaton and Wirt soils. Neotoma soils formed in a silty loess mantle and in sandstone residuum. They are in landscape positions similar to those of the Eden soils. Seaton soils formed entirely in loess. They are higher on the landscape than the Eden soils. Wirt soils formed in loamy alluvium.

Typical pedon of Eden flaggy silt loam, 20 to 30 percent slopes, 3,460 feet south and 3,620 feet east of the northwest corner of sec. 15, T. 4 S., R. 10 W., in the Renault Grant:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) flaggy silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; common limestone flagstones 1 to 3 feet long and 4 to 6 inches thick on the surface; about 35 percent flagstones 3 to 15 inches long and 25 percent coarse fragments less than 3 inches long; slightly acid; abrupt smooth boundary.

BA—3 to 6 inches; dark yellowish brown (10YR 4/4) flaggy silty clay loam; moderate fine subangular blocky structure; friable; few very fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings throughout; about 25 percent flagstones 3 to 15 inches long and 25 percent coarse fragments less than 3 inches long; neutral; clear smooth boundary.

2Bt1—6 to 12 inches; strong brown (7.5YR 5/6) flaggy silty clay; moderate fine subangular blocky structure; firm; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds and stones; about 25 percent flagstones 3 to 15 inches long and 30 percent coarse fragments less than 3 inches long; neutral; clear smooth boundary.

2Bt2—12 to 20 inches; strong brown (7.5YR 5/6) very flaggy silty clay; moderate fine subangular blocky structure; firm; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds and stones; about 45 percent flagstones 3 to 15 inches long and 35 percent coarse fragments less than 3 inches long; mildly alkaline; clear smooth boundary.

2Bt3—20 to 24 inches; strong brown (7.5YR 5/6) extremely flaggy silty clay; moderate fine subangular blocky structure; very firm; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds and stones; about 65 percent flagstones 3 to 15 inches long and 25 percent coarse fragments less than 3 inches long; strong effervescence; moderately alkaline; abrupt smooth boundary.

R—24 to 60 inches; very pale brown (10YR 7/4) limestone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The loess ranges from 0 to 20 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 3 to 6. It is silty clay loam, silty clay, or clay in the fine-earth fraction. The content of coarse fragments ranges from 20 to 90 percent in this horizon. Reaction ranges from strongly acid to moderately alkaline.

Edinburg Series

The Edinburg series consists of poorly drained, slowly permeable soils in upland depressions and drainageways. These soils formed in loess. Slope ranges from 0 to 2 percent.

Edinburg soils commonly are adjacent to Marine and Muren soils. The somewhat poorly drained Marine soils are on ridges. They have less organic matter in the surface layer and a lower reaction in the subsoil than the Edinburg soils. The moderately well drained Muren soils are on ridges and side slopes. They are fine-silty.

Typical pedon of Edinburg silt loam, 150 feet west and 120 feet south of the northeast corner of sec. 2, T. 2 S., R. 10 W.:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A—8 to 19 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; many prominent very dark gray (10YR 3/1) organic coatings on faces of peds; several light gray (10YR 7/2) splotches; medium acid; clear smooth boundary.

Btg1—19 to 25 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg2—25 to 31 inches; grayish brown (10YR 5/2) silty clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few faint gray (10YR 5/1) clay films on faces of peds; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg3—31 to 39 inches; grayish brown (10YR 5/2) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few faint gray (10YR 5/1) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg4—39 to 49 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; few faint gray (10YR 5/1) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bg—49 to 56 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

BCg—56 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; common medium prominent red (2.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); slightly acid.

The solum ranges from 50 to 60 inches in thickness. The mollic epipedon ranges from 10 to 24 inches in thickness and in some pedons includes the upper part of the argillic horizon.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or silty clay loam. The Btg horizon has hue of 10YR or 2.5Y and value of 3 to 6. It ranges from medium acid to neutral.

Fults Series

The Fults series consists of poorly drained soils on flood plains. These soils formed in fine textured, slack-water sediments and in the underlying loamy sediments. Permeability is very slow in the upper part of the profile and moderately rapid in the lower part. Slope ranges from 0 to 2 percent.

Fults soils are similar to Ambraw soils and commonly are adjacent to Ambraw, Booker, Nameoki, and Riley soils. Ambraw soils are fine-loamy. The very poorly drained Booker soils formed entirely in fine textured, slack-water sediments and are in the lower landscape positions. The somewhat poorly drained Nameoki and Riley soils are in the higher positions. Riley soils are fine-loamy.

Typical pedon of Fults silty clay, 120 feet west and 390 feet south of the northeast corner of sec. 4, T. 4 S., R. 11 W.:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate fine granular structure; very firm; common fine roots; neutral; abrupt smooth boundary.

A—7 to 12 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; very firm; few fine roots; neutral; clear smooth boundary.

Btg1—12 to 18 inches; dark gray (10YR 4/1) clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; few fine roots; many prominent very dark gray (5Y 3/1) clay films on faces of peds; neutral; clear smooth boundary.

Btg2—18 to 26 inches; dark gray (5Y 4/1) clay; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm; few fine roots; many faint very dark gray (5Y 3/1) clay films on faces of peds; neutral; clear smooth boundary.

Btg3—26 to 32 inches; dark gray (5Y 4/1) clay; common fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few fine roots; many faint very dark gray (5Y 3/1) clay films on faces of peds; neutral; clear smooth boundary.

2Btg4—32 to 38 inches; dark gray (5Y 4/1) clay loam; common medium prominent yellowish red (5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; many faint very dark gray (5Y 3/1) clay films on faces of peds; neutral; clear smooth boundary.

2Btg5—38 to 42 inches; gray (5Y 5/1) sandy clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; very friable; few fine roots; few faint very dark gray (5Y 3/1) clay films on faces of peds; neutral; clear smooth boundary.

2Cg—42 to 60 inches; dark gray (5Y 4/1) sandy loam; many medium prominent dark brown (7.5YR 4/4) mottles; massive; very friable; neutral.

The solum ranges from 30 to 60 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. Reaction ranges from medium acid to mildly alkaline throughout the profile. The fine textured sediments range from 25 to 40 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bt horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 2. The 2Bt horizon has hue of 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 3. It is loam, clay loam, sandy clay loam, or fine sandy loam. The 2C horizon is very fine sandy loam to sand and commonly has thin strata of silt loam, silty clay loam, clay loam, or loam.

Hamburg Series

The Hamburg series consists of somewhat excessively drained, moderately permeable soils on west-facing slopes near the crest of bluffs. These soils formed in calcareous loess. Slope ranges from 20 to 30 percent.

Hamburg soils are similar to Seaton soils and commonly are adjacent to Lacrescent and Seaton soils. Lacrescent soils formed in calcareous, loamy-skeletal, colluvial sediments and are downslope from the Hamburg soils. Seaton soils are not calcareous and are on very steep side slopes farther from the bluffs.

Typical pedon of Hamburg silt loam, 20 to 30 percent slopes, 900 feet northwest of intersection of Kidd Lake Road and Bluff Road and 600 feet northeast of Bluff Road, T. 4 S., R. 10 W.:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many fine roots; slight effervescence; moderately alkaline; clear smooth boundary.

C1—4 to 9 inches; dark yellowish brown (10YR 4/4) silt; weak medium granular structure; friable; many fine roots; common worm casts; slight effervescence; moderately alkaline; gradual smooth boundary.

C2—9 to 20 inches; brown (10YR 5/3) silt; weak medium granular structure; friable; common fine roots; common worm casts; strong effervescence; moderately alkaline; gradual smooth boundary.

C3—20 to 39 inches; yellowish brown (10YR 5/4) silt; weak medium granular structure; friable; few fine roots, common worm casts; strong effervescence; moderately alkaline; gradual smooth boundary.

C4—39 to 60 inches; yellowish brown (10YR 5/4) silt; weak medium granular structure; friable; few fine roots; few worm casts; few fine concretions (calcium carbonates); strong effervescence; moderately alkaline.

The A and C horizons are silt loam or silt. The A horizon has value of 3 or 4 and chroma of 2 or 3. The C horizon has value of 4 to 6. It is mildly alkaline or moderately alkaline.

Haynie Series

The Haynie series consists of moderately well drained, moderately permeable soils on flood plains along the major streams. These soils are on undulating ridges and wide terraces. They formed in stratified, silty and loamy alluvium. Slope ranges from 1 to 5 percent.

Haynie soils are similar to Rocher soils and commonly are adjacent to Aquents and to Ambraw, Rocher, and Sarpy soils. The poorly drained Ambraw soils and Aquents are in swales and depressions. They have more clay in the subsoil than the Haynie soils. Also, Aquents are subject to flooding for long periods. Rocher soils have less silt than the Haynie soils. Sarpy soils formed in sandy alluvium.

Typical pedon of Haynie silt loam, frequently flooded, 1 to 5 percent slopes, 300 feet west and 1,760 feet

north of the southeast corner of sec. 30, T. 3 S., R. 11 W.:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few fine roots; mildly alkaline; abrupt smooth boundary.

A—10 to 15 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; very friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; strong effervescence; moderately alkaline; abrupt smooth boundary.

C1—15 to 20 inches; stratified dark grayish brown (10YR 4/2) and brown (10YR 5/3) silt loam; very friable; few fine roots; strong effervescence; mildly alkaline; abrupt smooth boundary.

C2—20 to 26 inches; stratified very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) silty clay loam; few fine prominent brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; few fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.

C3—26 to 31 inches; stratified dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; very friable; few fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.

C4—31 to 39 inches; dark grayish brown (10YR 4/2) silt loam; few medium prominent brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; very friable; strong effervescence; mildly alkaline; clear smooth boundary.

C5—39 to 45 inches; dark gray (10YR 4/1) silt loam; few medium prominent brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; strong effervescence; moderately alkaline; clear smooth boundary.

C6—45 to 60 inches; dark grayish brown (10YR 4/2) stratified silt loam and loam; few fine distinct yellowish brown (10YR 5/6) mottles; very friable; strong effervescence; moderately alkaline.

The Ap or A horizon has value of 2 or 3 and chroma of 1 to 3. It is very fine sandy loam or silt loam. The C horizon is stratified loam, very fine loamy sand, silt loam, silty clay loam, and very fine sandy loam. It has value of 3 to 5 and chroma of 1 to 3. It is mildly alkaline or moderately alkaline.

Hickory Series

The Hickory series consists of well drained, moderately permeable soils on side slopes on deeply dissected till plains. These soils formed in a thin layer of loess and in loamy glacial till. Slope ranges from 20 to 35 percent.

Hickory soils are similar to Alford, Seaton, and Ursa soils and commonly are adjacent to Alford and Atlas soils. Alford and Seaton soils formed entirely in loess. They are in positions on the landscape similar to those of the Hickory soils. Alford soils also are on the adjacent ridges. The somewhat poorly drained Atlas soils have more clay in the subsoil than the Hickory soils, and Ursa soils have more clay in the control section.

Typical pedon of Hickory silt loam, 20 to 35 percent slopes, 100 feet west and 2,200 feet south of the center of sec. 31, T. 3 S., R. 7 W.:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many fine roots; about 20 percent sand; few fine pebbles; strongly acid; abrupt smooth boundary.

E—4 to 9 inches; yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/4) dry; moderate fine granular structure; friable; many fine roots; about 25 percent sand; few fine pebbles; very strongly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; few fine pebbles; very strongly acid; clear smooth boundary.

Bt2—16 to 24 inches; strong brown (7.5YR 5/6) clay loam; few medium prominent brown (10YR 5/3) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); few fine pebbles; very strongly acid; gradual smooth boundary.

Bt3—24 to 35 inches; strong brown (7.5YR 4/6) clay loam; common medium prominent brown (10YR 5/3) and common fine faint strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds; few medium dark concretions (iron and manganese oxides); few fine pebbles; very strongly acid; gradual smooth boundary.

Bt4—35 to 42 inches; strong brown (7.5YR 4/6) clay loam; common medium faint strong brown (7.5YR 5/6) and few fine prominent brown (10YR 5/3) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); few fine pebbles; medium acid; abrupt smooth boundary.

Bt5—42 to 47 inches; intermingled brown (10YR 5/3) and strong brown (7.5YR 5/6) loam; weak medium prismatic structure parting to weak medium angular blocky; friable; few very fine roots; few prominent strong brown (7.5YR 4/6) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); few fine pebbles; medium acid; abrupt smooth boundary.

Bt6—47 to 60 inches; intermingled brown (10YR 5/3) and strong brown (7.5YR 5/6) loam; weak medium prismatic structure parting to weak medium angular blocky; friable; few very fine roots; common prominent strong brown (7.5YR 4/6) clay films on faces of peds; many medium dark accumulations (iron and manganese oxides); few fine pebbles; medium acid.

The thickness of the solum and the depth to free carbonates range from 50 to 60 inches. The A1 horizon has value of 2 or 3. It is dominantly silt loam, but the range includes loam. The E horizon has value of 4 to 6 and chroma of 2 to 4. It is silt loam or loam. The B horizon has value of 4 or 5 and chroma of 3 to 6. It is loam or clay loam. It ranges from very strongly acid in the upper part to moderately alkaline in the lower part. Some pedons have a C horizon. This horizon is loam or clay loam and has many small pebbles.

Hurst Series

The Hurst series consists of somewhat poorly drained, very slowly permeable soils on terraces along the major streams. These soils formed in a thin mantle of loess and in fine textured, acid lacustrine sediments. Slope ranges from 1 to 7 percent.

Hurst soils are similar to Marine soils and commonly are adjacent to Birds, Colp, and Okaw soils. The poorly drained Birds and Okaw soils are in the lower positions on the landscape. Birds soils formed in silty sediments, are less acid than the Hurst soils, and are closer to the streams. Marine soils formed entirely in loess on uplands. The moderately well drained Colp soils commonly are in the higher areas.

Typical pedon of Hurst silt loam, 1 to 7 percent slopes, 1,500 feet east and 880 feet south of the northwest corner of sec. 31, T. 3 S., R. 7 W.:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

E1—9 to 13 inches; brown (10YR 5/3) silt loam; few fine faint grayish brown (10YR 5/2) mottles; moderate very fine angular blocky structure; friable; few fine roots; few distinct white (10YR 8/1) dry silt coatings on faces of peds; common medium dark concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

E2—13 to 16 inches; pale brown (10YR 6/3) silt loam; common fine faint grayish brown (10YR 5/2) mottles; moderate very fine subangular blocky structure; friable; few fine roots; many distinct white (10YR 8/1) dry silt coatings on faces of peds; common medium dark concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

BE—16 to 20 inches; brown (10YR 5/3) silty clay loam; moderate fine prismatic structure parting to moderate fine angular blocky; friable; few very fine roots; few prominent white (10YR 8/1) dry silt coatings on faces of peds; very strongly acid; gradual smooth boundary.

2Bt1—20 to 30 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) and few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; very strongly acid; gradual smooth boundary.

2Bt2—30 to 39 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) and few fine prominent reddish brown (5YR 4/4) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Bt3—39 to 46 inches; grayish brown (2.5Y 5/2) silty clay; few fine distinct light brownish gray (10YR 6/2) and few fine prominent reddish brown (5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; gradual smooth boundary.

2Bt4—46 to 60 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent yellowish brown (10YR 5/6) and few fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure; firm; few very fine roots; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid.

The solum ranges from 40 to 60 inches in thickness. The loess mantle is less than 24 inches thick.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon has value of 5 to 7 and chroma of 1 to 3. The 2Bt horizon has chroma of 10YR, 2.5Y, or 5Y and value of 4 to 6. It is silty clay loam, silty clay, or clay. It ranges from extremely acid to neutral. Some pedons have a 2C horizon within a depth of 60 inches. This

horizon is silty clay loam and commonly has strata of silt loam.

Lacrescent Series

The Lacrescent series consists of well drained, moderately rapidly permeable soils at the base of limestone bluffs. These soils formed in mixed calcareous loess and loamy colluvium and in loamy-skeletal colluvial sediments weathered from bedrock. Slope ranges from 30 to 70 percent.

The Lacrescent soils mapped in Monroe County do not have a Bw horizon, are calcareous throughout, and have a lower color value in the lower part of the solum than is definitive for the Lacrescent series. These differences, however, do not significantly affect the use or behavior of the soils.

Lacrescent soils commonly are adjacent to Drury and Hamburg soils. Drury soils formed in silty alluvium on foot slopes in the lower areas. They are not calcareous. Hamburg soils formed in calcareous loess more than 60 inches thick. They are near the top of the bluffs.

Typical pedon of Lacrescent flaggy silt loam, 30 to 70 percent slopes, 4,950 feet southeast of intersection of Kidd Lake Road and Bluff Road along Bluff Road and 100 feet northeast of Bluff Road, T. 4 S., R. 10 W., in Renault Grant:

A—0 to 18 inches; black (10YR 2/1) flaggy silt loam, dark gray (10YR 4/1) dry; moderate medium granular structure; about 50 percent flaggy and channery limestone fragments; many fine and many very fine roots; strong effervescence; moderately alkaline; diffuse smooth boundary.

C—18 to 60 inches; dark brown (10YR 3/3) extremely flaggy silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; about 70 percent flaggy and channery limestone fragments; few very fine roots; violent effervescence; moderately alkaline.

The A horizon has chroma of 2 or 3 and value of 1 or 2. The content of limestone fragments 6 to 15 inches long is 30 to 70 percent in this horizon. The C horizon has chroma of 3 or 4 and value of 2 to 4. The content of limestone fragments 3 to 15 inches long is 30 to 80 percent in this horizon. Reaction is mildly alkaline or moderately alkaline.

Landes Series

The Landes series consists of well drained soils that formed in loamy sediments. These soils are on undulating ridges and natural levees on flood plains along the major rivers and streams. Permeability is moderately rapid in the upper part and rapid in the lower part. Slope ranges from 1 to 7 percent.

Landes soils are similar to Rocher soils and commonly are adjacent to Ambraw, Fults, and Riley soils. The poorly drained Ambraw and Fults soils and the somewhat poorly drained Riley soils are in the lower positions on the landscape. Ambraw and Riley soils have less sand in the solum than the Landes soils. Fults soils have more clay in the subsoil than the Landes soils. Rocher soils are calcareous and do not have a mollic epipedon.

Typical pedon of Landes very fine sandy loam, 1 to 7 percent slopes, 1,740 feet south and 2,800 feet west of intersection of railroad tracks and Steppig Road, sec. 25, T. 1 S., R. 11 W.:

Ap—0 to 10 inches; very dark gray (10YR 3/1) very fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

A—10 to 14 inches; very dark gray (10YR 3/1) very fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; very friable; few fine roots; common faint black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

AB—14 to 21 inches; dark brown (10YR 3/3) very fine sandy loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; very friable; few fine roots; few distinct black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bw1—21 to 30 inches; brown (10YR 4/3) very fine sandy loam; weak fine subangular blocky structure; very friable; few fine roots; few faint brown (10YR 3/3) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bw2—30 to 39 inches; brown (10YR 4/3) very fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; neutral; gradual smooth boundary.

C—39 to 60 inches; dark yellowish brown (10YR 4/4) loamy very fine sand; single grain; loose; neutral.

The solum ranges from 25 to 40 inches in thickness. The mollic epipedon ranges from 10 to 18 inches in thickness. Reaction ranges from slightly acid to moderately alkaline throughout the profile.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bw horizon has chroma of 3 or 4. The C horizon has value of 4 to 6 and chroma of 3 or 4.

Marine Series

The Marine series consists of somewhat poorly drained, slowly permeable soils that formed in loess. These soils are on upland ridges and side slopes. Slope ranges from 0 to 5 percent.

Marine soils are similar to Coulterville and Hurst soils and commonly are adjacent to Blair, Muren, and

Rushville soils. Blair soils are fine-silty. They are on the lower sides of ridges. Coulterville soils are fine-silty. The content of sodium in their subsoil is higher than that in the subsoil of the Marine soils. Hurst soils do not have an abrupt textural change and have a subsoil that formed in lacustrine sediments. The moderately well drained Muren soils have less clay in the control section than the Marine soils. They are in the higher areas. The poorly drained Rushville soils are in the lower areas and in depressions.

Typical pedon of Marine silt loam, 2 to 5 percent slopes, 940 feet east and 1,260 feet north of the center of sec. 35, T. 3 S., R. 9 W.:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

E—8 to 12 inches; light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry; many fine distinct yellowish brown (10YR 5/4) mottles; moderate fine granular blocky structure; friable; common very fine roots; few fine dark concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

Bt1—12 to 16 inches; brown (10YR 5/3) silty clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; friable; common very fine roots; many distinct light brownish gray (10YR 6/2) clay films on faces of peds; common prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt2—16 to 24 inches; brown (10YR 5/3) silty clay; common medium prominent strong brown (7.5YR 4/6) and common fine faint grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; friable; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt3—24 to 35 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent strong brown (7.5YR 4/6) and few fine prominent yellowish red (5YR 4/6) mottles; moderate medium prismatic structure parting to weak medium angular blocky; friable; few faint grayish brown (10YR 5/2) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt4—35 to 42 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent brown (7.5YR 4/4) and common medium prominent yellowish red (5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few faint grayish brown (10YR 5/2) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

BC—42 to 52 inches; light brownish gray (10YR 6/2) silt loam; many medium prominent brown (7.5YR 4/4) and common medium prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to weak fine angular blocky; friable; common medium dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

C—52 to 60 inches; grayish brown (10YR 5/2) silt loam; many medium prominent strong brown (7.5YR 5/6) and common fine prominent reddish brown (5YR 4/4) mottles; weak medium prismatic structure; friable; few medium dark accumulations (iron and manganese oxides); slightly acid.

The solum ranges from 50 to 60 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon has value of 5 to 7 and chroma of 1 or 2. Some pedons have a thin B/E horizon. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is very strongly acid to slightly acid. The BC and C horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2.

Muren Series

The Muren series consists of moderately well drained, moderately permeable soils on loess-covered uplands. These soils are on ridgetops and side slopes. Slope ranges from 2 to 15 percent.

Muren soils are similar to Blair and Colp soils and commonly are adjacent to Alford, Atlas, Blair, and Marine soils. The well drained Alford soils are in the slightly higher landscape positions. The somewhat poorly drained Atlas soils formed in glacial till on the steeper side slopes. The somewhat poorly drained Blair soils formed in silty, water-worked sediments on the lower side slopes. Colp and Marine soils have more clay in the subsoil than the Muren soils. Colp soils formed in lacustrine sediments. The somewhat poorly drained Marine soils are in the less sloping areas.

Typical pedon of Muren silt loam, 2 to 5 percent slopes, 2,180 feet east and 640 feet north of the southwest corner of sec. 31, T. 1 S., R. 9 W.:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine roots; few fine dark accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

E—9 to 14 inches; yellowish brown (10YR 5/4) silt loam, light yellowish brown (10YR 6/4) dry; moderate

medium platy structure; friable; common very fine roots; many prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

BE—14 to 22 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct dark yellowish brown (10YR 4/6) and few fine distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate fine angular blocky; friable; common very fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few prominent white (10YR 8/1) dry silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—22 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and common medium faint dark yellowish brown (10YR 4/6) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; friable; common very fine roots; common prominent brown (7.5YR 5/2) clay films on faces of peds; few discontinuous white (10YR 8/1) dry silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—31 to 38 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; friable; common very fine roots; few prominent brown (7.5YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

BC—38 to 43 inches; mottled grayish brown (10YR 5/2), strong brown (7.5YR 4/6), and yellowish red (5YR 4/6) silt loam; weak medium prismatic structure parting to moderate fine angular blocky; friable; few very fine roots; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

C—43 to 60 inches; mottled light brownish gray (10YR 6/2), strong brown (7.5YR 4/6), and yellowish red (5YR 4/6) silt loam; weak medium prismatic structure; friable; few very fine roots; many coarse dark accumulations (iron and manganese oxides); slightly acid.

The solum ranges from 40 to 60 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 to 4. It is dominantly silt loam but in eroded pedons is silty clay loam. The E horizon has value of 4 or 5 and chroma of 3 or 4. Eroded pedons commonly do not have an E horizon. The Bt horizon is silty clay loam or silt loam. It has value of 4 to 6 and chroma of 3 or 4. It is medium acid or strongly acid. The C horizon has value of 5 or 6 and chroma of 2 to 4.

Nameoki Series

The Nameoki series consists of somewhat poorly drained soils on flood plains. These soils formed in fine textured, slack-water sediments and in the underlying loamy sediments. Permeability is very slow in the upper part of the profile and moderate in the lower part. Slope ranges from 0 to 2 percent.

Nameoki soils are similar to Riley and Tice soils and commonly are adjacent to Fults and Landes soils. The poorly drained Fults soils are in depressions and in the lower positions on the landscape. The well drained Landes soils are on ridges. Landes and Riley soils have more sand in the upper part of the solum than the Nameoki soils. Riley and Tice soils are in landscape positions similar to those of the Nameoki soils. Tice soils have less clay in the upper part of the solum than the Nameoki soils.

Typical pedon of Nameoki silty clay, 120 feet east and 30 feet north of the center of sec. 4, T. 4 S., R. 11 W.:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate medium granular structure; firm; few fine roots; neutral; abrupt smooth boundary.

A—10 to 14 inches; very dark grayish brown (10YR 3/2) silty clay, gray (10YR 5/1) dry; moderate fine subangular blocky structure; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; firm; few fine roots; neutral; clear smooth boundary.

Bw1—14 to 21 inches; dark brown (10YR 4/3) clay; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; few fine roots; common prominent very dark grayish brown (2.5Y 3/2) pressure faces on peds; neutral; clear smooth boundary.

Bw2—21 to 30 inches; dark brown (10YR 4/3) clay; common fine prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; few fine roots; many prominent dark grayish brown (2.5Y 3/2) pressure faces on peds; neutral; clear smooth boundary.

2Bg1—30 to 50 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; moderate fine subangular blocky structure; friable; few fine roots; common faint dark gray (10YR 4/1) and prominent very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; mildly alkaline; clear smooth boundary.

2Bg2—50 to 56 inches; dark grayish brown (10YR 4/2) clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable; few fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; neutral; clear smooth boundary.

2Cg—56 to 60 inches; dark grayish brown (10YR 4/2) sandy loam; few fine faint dark gray (10YR 4/1) and common medium prominent strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few fine roots; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. The depth to the 2Bg horizon ranges from 24 to 36 inches.

The A horizon has value of 2 or 3. It is silty clay or silty clay loam. The Bw horizon has hue of 2.5Y or 10YR, value of 3 to 5, and chroma of 2 to 4. It is silty clay loam, silty clay, or clay. It is strongly acid to neutral. The 2Bg horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 1 to 3. It is silty clay loam, clay loam, loam, or sandy loam. It is strongly acid to mildly alkaline. The 2Cg horizon has value of 4 to 6 and chroma of 1 to 3. It ranges from silty clay loam to very fine sand.

Neotoma Series

The Neotoma series consists of well drained soils on upland side slopes. These soils formed in a thin mantle of loess and in sandstone and shale residuum. Permeability is moderate in the upper part of the profile and moderately rapid in the lower part. Slope ranges from 20 to 35 percent.

Neotoma soils are similar to Eden soils and commonly are adjacent to Westmore and Wirt soils. Eden soils have more clay in the subsoil than the Neotoma soils and formed in material weathered from limestone. Westmore soils are higher on the landscape than the Neotoma soils. Also, they formed in thicker loess over residuum and have a few sandstone flagstones in the upper part. Wirt soils formed in loamy sediments that have coarse fragments. They are along streams.

Typical pedon of Neotoma flaggy silt loam, in an area of Westmore-Neotoma complex, 20 to 35 percent slopes, 1,100 feet south and 2,430 feet west of the northeast corner of sec. 20, T. 4 S., R. 9 W.:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) flaggy silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; about 15 percent flagstones and 5 percent channers; neutral; abrupt smooth boundary.

E—3 to 7 inches; brown (10YR 5/3) very flaggy silt loam; few fine distinct brown (7.5YR 5/4) mottles; weak fine subangular blocky structure; friable; common fine roots; about 30 percent flagstones and 20 percent channers; medium acid; abrupt smooth boundary.

BE—7 to 10 inches; strong brown (7.5YR 5/6) extremely flaggy loam; weak fine subangular blocky structure; friable; few very fine roots; about 45 percent flagstones and 25 percent channers; very strongly acid; clear smooth boundary.

Bt1—10 to 15 inches; strong brown (7.5YR 5/6) extremely flaggy sandy loam; weak fine subangular blocky structure; friable; few very fine roots; few faint reddish brown (5YR 5/4) clay films on faces of peds; about 40 percent flagstones and 25 percent channers; very strongly acid; gradual smooth boundary.

Bt2—15 to 25 inches; yellowish red (5YR 5/6) extremely flaggy sandy loam; weak fine subangular blocky structure; friable; few very fine roots; few faint reddish brown (5YR 5/4) clay films on faces of peds; few medium accumulations (iron and manganese oxides); about 35 percent flagstones and 30 percent channers; very strongly acid; gradual smooth boundary.

Bt3—25 to 30 inches; strong brown (7.5YR 5/6) extremely flaggy loam; weak fine subangular blocky structure; friable; few very fine roots; common faint reddish brown (5YR 5/4) clay films on faces of peds; about 40 percent flagstones and 25 percent channers; very strongly acid; gradual smooth boundary.

BC—30 to 60 inches; strong brown (7.5YR 5/6) very flaggy sandy clay loam; weak fine subangular blocky structure; friable; few very fine roots; common prominent reddish brown (5YR 5/4) clay films on faces of peds; about 35 percent flagstones and 15 percent channers; very strongly acid.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has chroma of 3 or 4. The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, silty clay loam, loam, clay loam, silty clay, or sandy clay loam in the fine-earth fraction. The content of coarse fragments in this horizon ranges from 15 to 90 percent. Reaction ranges from very strongly acid to slightly acid.

Okaw Series

The Okaw series consists of poorly drained, very slowly permeable soils on terraces along the major streams. These soils formed in a thin mantle of loess over fine textured, acid lacustrine sediments. Slope ranges from 0 to 2 percent.

Okaw soils are similar to Birds and Rushville soils and commonly are adjacent to Birds and Hurst soils. Birds and Hurst soils do not change abruptly in texture. Birds soils formed in silty sediments, have less clay than the Okaw soils, are less acid, and are closer to the streams. The somewhat poorly drained Hurst soils are in the higher positions on the landscape. Rushville soils formed entirely in loess on uplands.

Typical pedon of Okaw silt loam, 1,200 feet east and 1,050 feet south of the northwest corner of sec. 31, T. 3 S., R. 10 W.:

Ap—0 to 10 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine granular structure; friable; common fine roots; common fine dark concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

E—10 to 17 inches; light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; friable; few fine roots; many prominent white (10YR 8/1) dry silt coatings on faces of peds; common fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

2Btg1—17 to 20 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and few fine faint dark grayish brown (10YR 4/2) mottles; moderate fine angular blocky structure; friable; few very fine roots; common prominent grayish brown (10YR 8/1) dry silt coatings on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Btg2—20 to 26 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Btg3—26 to 32 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent strong brown (7.5YR 5/6) and few fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common prominent dark grayish brown (10YR 4/2) clay films on faces of peds; common prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Btg4—32 to 42 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Btg5—42 to 51 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; many distinct very dark grayish brown (2.5Y 3/2) clay films on faces of peds; few prominent white (10YR 8/1) dry silt coatings on faces of peds; few fine dark concretions (iron and manganese oxides); strongly acid; gradual smooth boundary.

2Btg6—51 to 60 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common prominent dark olive gray (5Y 3/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); slightly acid.

The solum ranges from 40 to 60 inches in thickness. The depth to clayey lacustrine sediments ranges from 12 to 20 inches.

The Ap horizon has value of 4 or 5 and chroma of 1 to 3. Pedons in uncultivated areas have a thin A1 horizon. The E horizon has value of 5 to 7 and chroma of 1 or 2. The 2Bt horizon has value of 4 to 6 and chroma of 1 or 2. It is silty clay, clay, or silty clay loam. It is very strongly acid to medium acid.

Raddle Series

The Raddle series consists of well drained, moderately permeable soils on flood plains. These soils formed in silty alluvium on alluvial fans. Slope ranges from 0 to 3 percent.

Raddle soils are similar to Drury soils and commonly are adjacent to Arenzville, Drury, Dupo, Tice, and Wilbur soils. Arenzville soils formed in light colored, silty alluvium over dark colored, silty alluvium. Drury soils are in the higher positions on foot slopes. They have less organic matter in the surface layer than the Raddle soils. The somewhat poorly drained Dupo and Tice soils and the moderately well drained Wilbur soils are in the lower landscape positions. Dupo soils are underlain by clayey or silty alluvium. Wilbur soils formed in light-colored, silty alluvium.

Typical pedon of Raddle silt loam, 1,860 feet southwest of railroad tracks and 1,260 feet northwest of Maeystown Creek in parcel S. 706, T. 4 S., R. 11 W.:

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common medium roots; slightly acid; abrupt smooth boundary.

A—11 to 19 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; few fine roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bw1—19 to 23 inches; dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; few very fine roots; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.
Bw2—23 to 31 inches; dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; few very fine roots; many faint very dark grayish brown (10YR 3/2) and few faint very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.
Bw3—31 to 35 inches; dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.
Bw4—35 to 51 inches; very dark grayish brown (10YR 3/2) silt loam; few fine faint brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few very fine roots; few fine irregular accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.
Bw5—51 to 60 inches; dark brown (10YR 4/3) silt loam; common fine distinct dark brown (7.5YR 4/4) and few fine faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine irregular accumulations (iron and manganese oxides); slightly acid.

The solum ranges from 50 to 60 inches in thickness. The mollic epipedon ranges from 10 to 24 inches in thickness. Reaction is medium acid to neutral throughout the profile.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bw horizon has value of 3 to 5 and chroma of 3 or 4.

Riley Series

The Riley series consists of somewhat poorly drained soils on low terraces on flood plains. These soils formed in loamy alluvium. Permeability is moderate in the solum and rapid in the underlying material. Slope ranges from 0 to 3 percent.

The Riley soils mapped in Monroe County are taxadjuncts to the Riley series because they do not have contrasting textures within a depth of 40 inches. This difference, however, does not significantly affect the use or behavior of the soils.

Riley soils are similar to Nameoki soils and commonly are adjacent to Ambraw, Fults, and Landes soils. The poorly drained Ambraw and Fults soils are in the lower positions on the landscape. Fults soils have more clay in the solum than the Riley soils. The well drained Landes soils are on ridges and the higher terraces. They have less clay in the subsoil than the Riley soils. Nameoki soils have more clay and less sand in the upper part of the solum than the Riley soils.

Typical pedon of Riley loam, 0 to 3 percent slopes, 140 feet east and 3,540 feet south of the northwest corner of sec. 14, T. 2 S., R. 11 W.:

Ap—0 to 11 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.
Bw1—11 to 19 inches; dark yellowish brown (10YR 4/4) clay loam; few fine distinct strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; many prominent very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.
Bw2—19 to 25 inches; dark grayish brown (10YR 4/2) sandy clay loam; few fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common prominent very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.
BC—25 to 33 inches; dark yellowish brown (10YR 4/4) sandy loam; few fine distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to weak medium subangular blocky; very friable; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.
C1—33 to 45 inches; brown (10YR 5/3) loamy sand; few fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; slightly acid; clear smooth boundary.
C2—45 to 60 inches; brown (10YR 5/3) loamy sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; neutral.

The solum ranges from 30 to 40 inches in thickness. The mollic epipedon ranges from 10 to 16 inches in thickness.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is loam or silty clay loam. The Bw horizon has value of 3 to 5 and chroma of 2 to 4. It is clay loam, sandy clay loam, sandy loam, or silty clay loam. It ranges from medium acid to mildly alkaline. The C horizon is sand, loamy sand, or loamy fine sand.

Rocher Series

The Rocher series consists of somewhat excessively drained, moderately rapidly permeable soils on flood plains. These soils are on undulating ridges and natural levees. They formed in loamy alluvium. Slope ranges from 1 to 7 percent.

The Rocher soils mapped in Monroe County have a lower content of fine sand or coarser sand than is

definitive for the Rocher series. This characteristic, however, does not significantly affect the use or behavior of the soils.

Rocher soils are similar to Haynie and Landes soils and commonly are adjacent to Ambraw and Haynie soils. The poorly drained Ambraw soils are in depressions and the lower landscape positions. They have strata of loam, very fine loamy sand, clay loam, and silty clay loam. The moderately well drained Haynie soils are in landscape positions similar to those of the Rocher soils. They have more silt than the Rocher soils. The well drained Landes soils have more organic matter in the surface layer than the Rocher soils and are not calcareous.

Typical pedon of Rocher loam, rarely flooded, 1 to 7 percent slopes, 1,520 feet northeast of Levee Road and 60 feet northwest of the southeast boundary of parcel S. 314, T. 5 S., R. 10 W.:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; few fine roots; slight effervescence; mildly alkaline; abrupt smooth boundary.

C1—10 to 30 inches; light brownish gray (10YR 6/2) very fine sandy loam; a few thin strata that are very dark grayish brown (10YR 3/2); single grain; loose; few very fine roots; strong effervescence; moderately alkaline; clear smooth boundary.

C2—30 to 50 inches; stratified light brownish gray (10YR 6/2) and dark brown (10YR 4/3) very fine sandy loam; single grain; loose; few fine roots; strong effervescence; moderately alkaline; clear smooth boundary.

C3—50 to 60 inches; grayish brown (10YR 5/2) very fine sandy loam; single grain; loose; strong effervescence; moderately alkaline.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The C horizon has value of 4 to 6 and chroma of 2 to 4. In some pedons it has thin lenses of fine sand, loamy fine sand, or loam. It is mildly alkaline or moderately alkaline.

Rushville Series

The Rushville series consists of poorly drained, very slowly permeable soils that formed in loess. These soils are on broad upland divides and at the head of drainageways. Slope ranges from 0 to 2 percent.

Rushville soils are similar to Coulterville Variant and Okaw soils and commonly are adjacent to Marine soils. The subsoil of Coulterville Variant soils has a higher content of sodium than that of the Rushville soils. The somewhat poorly drained Marine soils are in the higher positions on the landscape. Okaw soils formed in lacustrine sediments on low terraces.

Typical pedon of Rushville silt loam, 320 feet west and 2,590 feet north of the southeast corner of sec. 35, T. 3 S., R. 9 W.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

E1—8 to 13 inches; light brownish gray (10YR 6/2) silt loam, white (10YR 8/2) dry; few fine prominent strong brown (7.5YR 4/6) mottles; moderate fine subangular blocky structure; friable; few fine roots; few prominent dark grayish brown (10YR 4/2) organic coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

E2—13 to 19 inches; light brownish gray (10YR 6/2) silt loam, white (10YR 8/2) dry; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few fine roots; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Btg1—19 to 25 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; few fine roots; common faint grayish brown (2.5Y 5/2) clay films on faces of peds; common prominent white (10YR 8/2) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg2—25 to 35 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many faint grayish brown (2.5Y 5/2) clay films on faces of peds; many prominent white (10YR 8/2) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg3—35 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many faint grayish brown (2.5Y 5/2) clay films on faces of peds; common prominent white (10YR 8/2) dry silt coatings on faces of peds; common fine dark accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg4—43 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular

blocky; friable; few fine roots; few faint grayish brown (2.5Y 5/2) clay films on faces of peds; common prominent white (10YR 8/2) dry silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

BCg—52 to 60 inches; gray (10YR 6/1) silt loam; common medium prominent strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; friable; few fine roots; common prominent dark brown (7.5YR 4/2) and few faint grayish brown (2.5Y 5/2) clay films lining root channels; many fine dark accumulations (iron and manganese oxides); strongly acid.

The solum ranges from 40 to 60 inches in thickness. The Ap horizon has chroma of 1 or 2. The E horizon has value of 6 or 7. The Btg horizon has value of 4 to 6.

Sarpy Series

The Sarpy series consists of excessively drained, rapidly permeable soils on undulating ridges on flood plains. These soils formed in sandy alluvium. Slope ranges from 1 to 7 percent.

Sarpy soils commonly are adjacent to Ambraw and Haynie soils. The poorly drained Ambraw soils are in depressions and the lower landscape positions. They have strata of loam, very fine loamy sand, clay loam, and silty clay loam. The moderately well drained Haynie soils are in landscape positions similar to those of the Sarpy soils. They are coarse-silty.

Typical pedon of Sarpy fine sand, frequently flooded, 1 to 7 percent slopes, 2,600 feet west and 2,280 feet south of the northeast corner of sec. 6, T. 3 S., R. 11 W.:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; common very fine roots; weak effervescence; mildly alkaline; abrupt smooth boundary.

C1—9 to 19 inches; dark grayish brown (10YR 4/2) fine sand; single grain; loose; few very fine roots; strong effervescence; mildly alkaline; gradual smooth boundary.

C2—19 to 29 inches; dark grayish brown (10YR 4/2) fine sand; few coarse faint brown (10YR 4/3) mottles; single grain; loose; few very fine roots; few fine dark accumulations (iron and manganese oxides); strong effervescence; mildly alkaline; gradual smooth boundary.

C3—29 to 56 inches; dark grayish brown (10YR 4/2) fine sand; common medium faint brown (10YR 4/3) mottles; single grain; loose; few very fine roots; common dark accumulations (iron and manganese oxides) in bands 0.25 to 0.5 inch thick; strong effervescence; mildly alkaline; gradual smooth boundary.

C4—56 to 60 inches; dark grayish brown (10YR 4/2) fine sand; common medium faint brown (10YR 4/3) mottles; single grain; loose; strong effervescence; mildly alkaline.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is loamy fine sand, fine sand, or fine sandy loam. The C horizon has value of 4 or 5 and chroma of 2 to 4. It is loamy fine sand, loamy sand, or fine sand. It is mildly alkaline or moderately alkaline.

Seaton Series

The Seaton series consists of well drained, moderately permeable soils that formed in loess on side slopes. Slope ranges from 30 to 60 percent.

Seaton soils are similar to Alford and Hamburg soils and commonly are adjacent to Alford, Hamburg, and Lacrescent soils. Alford soils are on ridges. They have more clay in the subsoil than the Seaton soils. Hamburg soils are on the crest of bluffs. They are calcareous. Lacrescent soils formed in calcareous, loamy-skeletal colluvial sediments on the west-facing side of the bluffs.

Typical pedon of Seaton silt loam, 30 to 60 percent slopes, 260 feet east and 520 feet north of the southwest corner of sec. 25, T. 4 S., R. 10 W.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few very fine roots; slightly acid; abrupt smooth boundary.

E1—1 to 3 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few very fine roots; medium acid; abrupt smooth boundary.

E2—3 to 6 inches; brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; friable; few very fine roots; very strongly acid; clear smooth boundary.

BE—6 to 11 inches; dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; few very fine roots; very strongly acid; gradual smooth boundary.

Bt1—11 to 24 inches; dark brown (7.5YR 4/4) silt loam; weak medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; common faint strong brown (7.5YR 4/6) clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—24 to 38 inches; dark brown (7.5YR 4/4) silt loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; few very fine roots; common faint strong brown (7.5YR 4/6) clay films on faces of peds; few prominent discontinuous white

(10YR 8/1) dry silt coatings on faces of peds; strongly acid; gradual smooth boundary.
Bt3—38 to 45 inches; dark brown (7.5YR 4/4) silt loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; few very fine roots; few faint strong brown (7.5YR 4/6) clay films on faces of peds; common faint white (10YR 8/1) dry silt coatings on faces of peds; medium acid; gradual smooth boundary.
BC—45 to 60 inches; dark brown (7.5YR 4/4) silt loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; many faint white (10YR 8/1) dry silt coatings on faces of peds; medium acid.

The solum ranges from 50 to 60 inches in thickness. The A horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is very strongly acid to neutral.

Tice Series

The Tice series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slope ranges from 0 to 2 percent.

Tice soils are similar to Nameoki soils and commonly are adjacent to Beaucoup and Raddle soils. The poorly drained Beaucoup soils are in the lower positions on the flood plains. Nameoki soils have more clay in the subsoil and more sand in the underlying material than the Tice soils. The well drained Raddle soils are in higher positions on the flood plains.

Typical pedon of Tice silty clay loam, 550 feet southwest of railroad tracks and 150 feet southeast of Outlet Road in parcel S. 707, T. 4 S., R. 11 W.:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.
A—9 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; few fine roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.
Bw1—15 to 20 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.
Bw2—20 to 28 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; friable; few fine roots; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.
Bw3—28 to 37 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine faint grayish brown (10YR 5/2) and few fine prominent dark brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common faint dark gray (10YR 4/1) clay films in pores and root channels; neutral; clear smooth boundary.
Bw4—37 to 49 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine faint grayish brown (10YR 5/2) and common fine prominent dark brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common faint dark gray (10YR 4/1) clay films in pores and root channels; neutral; clear smooth boundary.
Bg1—49 to 56 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent dark brown (7.5YR 4/4) and few fine prominent reddish brown (5YR 4/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; common faint dark grayish brown (10YR 4/2) clay films in pores and root channels; few fine irregular accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.
Bg2—56 to 60 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few faint dark grayish brown (10YR 4/2) clay films in pores and root channels; few fine irregular accumulations (iron and manganese oxides); slightly acid.

The solum ranges from 40 to 60 inches in thickness. The mollic epipedon ranges from 10 to 22 inches in thickness.

The A horizon has value of 2 or 3. It is silty clay loam or silt loam. The Bw and Bg horizons have chroma of 2 or 3. In some pedons they have strata of silt loam, clay loam, loam, or sandy loam. They range from medium acid to mildly alkaline. Some pedons have a C horizon within a depth of 60 inches.

Ursa Series

The Ursa series consists of well drained, slowly permeable soils on convex side slopes on deeply dissected till plains. These soils formed in a thin layer of pedisediment and in glacial till that has a strongly developed paleosol. Slope ranges from 20 to 35 percent.

Ursa soils are similar to Hickory soils and commonly are adjacent to Alford and Muren soils. The well drained Alford and Hickory soils are in landscape positions similar to those of the Ursa soils. Alford soils are fine-silty and formed entirely in loess. Hickory soils are fine-loamy. The moderately well drained Muren soils formed in loess and are on ridges and the upper ends of drainageways.

Typical pedon of Ursa silt loam, 20 to 35 percent slopes, 1,200 feet east and 1,000 feet north of the center of sec. 9, T. 4 S., R. 9 W.:

A—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; common very fine roots; few fine pebbles; strongly acid; abrupt smooth boundary.

E—2 to 6 inches; brown (10YR 5/3) loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; friable; few very fine roots; few fine dark accumulations (iron and manganese oxides); few fine pebbles; very strongly acid; abrupt smooth boundary.

BE—6 to 11 inches; strong brown (7.5YR 5/6) loam; common medium prominent pale brown (10YR 6/3) mottles; moderate fine subangular blocky structure; friable; few very fine roots; few fine dark accumulations (iron and manganese oxides); few fine pebbles; very strongly acid; clear smooth boundary.

Bt1—11 to 17 inches; strong brown (7.5YR 5/6) clay loam; common fine prominent pale brown (10YR 6/3) mottles; weak fine prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; very few distinct brown (7.5YR 5/4) clay films on faces of peds; few medium dark accumulations (iron and manganese oxides); few fine pebbles; very strongly acid; clear smooth boundary.

Bt2—17 to 24 inches; strong brown (7.5YR 5/6) clay loam; common medium prominent light brownish gray (10YR 6/2) and few fine prominent yellowish red (5YR 4/6) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; few distinct brown (7.5YR 4/4) clay films on faces of peds; few medium dark accumulations (iron and manganese oxides); few fine pebbles; very strongly acid; clear smooth boundary.

Bt3—24 to 32 inches; strong brown (7.5YR 5/6) clay; common medium prominent gray (10YR 6/1) and few fine prominent reddish brown (5YR 4/4) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; few distinct brown (7.5YR 4/4) clay films on faces of peds; few medium dark accumulations (iron and manganese oxides); few fine pebbles; very strongly acid; clear smooth boundary.

Bt4—32 to 42 inches; mottled gray (10YR 6/1) and brown (7.5YR 4/4) clay loam; moderate fine prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; very few distinct light brownish gray (10YR 6/2) clay films on faces of peds; common medium dark accumulations (iron and manganese oxides); few fine pebbles; strongly acid; clear smooth boundary.

BC—42 to 60 inches; mottled light brownish gray (10YR 6/2) and brown (7.5YR 4/4) clay loam; weak medium prismatic structure; firm; very few distinct gray (10YR 5/1) clay films on faces of peds; common fine pebbles; medium acid.

The solum ranges from 50 to 60 inches in thickness. The A horizon has chroma of 2 to 4. The E horizon has value of 4 or 5 and chroma of 2 to 4. It is loam or silt loam. The Bt horizon has hue of 10YR, 7.5YR, or 5Y, value of 4 to 6, and chroma of 3 to 6. The mottles that have chroma of 2 have residual colors of the parent material and are not caused by wetness. The Bt horizon is clay loam, silty clay loam, silty clay, or clay. It ranges from very strongly acid to neutral.

Wakeland Series

The Wakeland series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty sediments along upland streams and on alluvial fans. Slope ranges from 0 to 2 percent.

Wakeland soils are similar to Banlic, Dupo, and Wilbur soils and commonly are adjacent to Banlic, Birds, Dupo, and Wilbur soils. Banlic soils are at the slightly higher elevations. They have a firm Bx horizon. Dupo soils and the poorly drained Birds soils are in the lower landscape positions. Dupo soils are underlain by clayey and silty alluvium. The moderately well drained Wilbur soils are in the higher landscape positions.

Typical pedon of Wakeland silt loam, frequently flooded, 240 feet east and 800 feet north of the center of sec. 15, T. 3 S., R. 8 W.:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; many medium faint grayish brown (10YR 5/2) and few fine prominent dark brown (7.5YR 4/4) mottles; moderate fine granular structure; friable; common fine roots; neutral; clear smooth boundary.

A—6 to 12 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; common medium faint grayish brown (10YR 5/2) and few fine prominent strong brown (7.5YR 4/6) mottles; weak fine granular structure; friable; few very fine roots; neutral; gradual smooth boundary.

C—12 to 30 inches; grayish brown (10YR 5/2) silt loam; common medium prominent strong brown (7.5YR

4/6) mottles; massive; friable; few very fine roots; many medium faint dark grayish brown (10YR 4/2) channel fillings; neutral; gradual smooth boundary.

Cg1—30 to 44 inches; gray (10YR 5/1) silt loam; common medium prominent dark brown (7.5YR 4/4) and few fine faint light brownish gray (10YR 6/2) mottles; massive; friable; few very fine roots; few fine dark accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Cg2—44 to 60 inches; dark grayish brown (10YR 4/2) silt loam; few fine prominent dark brown (7.5YR 4/4) mottles; massive; friable; few very fine roots; neutral.

The A horizon has value of 4 or 5 and chroma of 2 or 3. The C and Cg horizons have value of 4 to 6 and chroma of 1 to 4. They are dominantly silt loam, but in some pedons they have thin strata of loam or fine sandy loam. They range from medium acid to neutral.

Westmore Series

The Westmore series consists of well drained soils that formed in loess and in material weathered from interbedded sandstone or shale. These soils are on upland side slopes. Permeability is moderate in the upper part of the profile and slow in the lower part. Slope ranges from 20 to 35 percent.

Westmore soils are similar to Alford soils and commonly are adjacent to Alford and Neotoma soils. Alford soils are on ridges and side slopes. They formed entirely in loess. Neotoma soils are lower on the landscape than the Westmore soils. Also, they have a higher content of coarse fragments throughout. They formed in a thin mantle of loess and in sandstone and shale residuum.

Typical pedon of Westmore silt loam, in an area of Westmore-Neotoma complex, 20 to 35 percent slopes, 1,300 feet south and 2,280 feet west of the northeast corner of sec. 20, T. 4 S., R. 9 W.:

A—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

E—2 to 6 inches; brown (10YR 5/3) silt loam; few fine distinct dark brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; friable; few very fine roots; strongly acid; clear smooth boundary.

BE—6 to 10 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; few very fine roots; strongly acid; clear smooth boundary.

Bt1—10 to 16 inches; strong brown (7.5YR 5/6) silt loam; moderate fine subangular blocky structure; friable; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—16 to 22 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—22 to 27 inches; brown (7.5YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; common faint dark brown (7.5YR 4/4) clay films and common prominent very pale brown (10YR 7/3) dry silt coatings on faces of peds; few fine round and irregular concretions (iron and manganese oxides); about 5 percent fine sandstone fragments; strongly acid; clear smooth boundary.

2Bt4—27 to 32 inches; strong brown (7.5YR 4/6) silty clay; few fine prominent dark red (2.5YR 3/6) and few fine distinct brown (7.5YR 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common faint dark brown (7.5YR 4/4) clay films and common prominent very pale brown (10YR 7/3) dry silt coatings on faces of peds; few medium round and irregular concretions (iron and manganese oxides); about 5 to 10 percent fine sandstone fragments; strongly acid; abrupt smooth boundary.

2Bt5—32 to 60 inches; mottled brown (7.5YR 5/4) and strong brown (7.5YR 5/6) clay; common fine faint dark red (2.5YR 3/6) mottles; weak medium prismatic structure; extremely firm; few very fine roots; few faint dark brown (7.5YR 4/4) clay films on faces of peds; about 10 to 15 percent sandstone fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. The depth to sandstone or shale is more than 48 inches. The A horizon has value of 3 or 4 and chroma of 2 or 3. The Bt and 2Bt horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Reaction ranges from very strongly acid to medium acid in the Bt horizon and from strongly acid to neutral in the 2Bt horizon.

Wilbur Series

The Wilbur series consists of moderately well drained, moderately permeable soils on flood plains. These soils formed in silty sediments along upland streams and on alluvial fans. Slope ranges from 0 to 2 percent.

Wilbur soils are similar to Arenzville and Wakeland soils and commonly are adjacent to Arenzville, Dupo, and Wakeland soils. The well drained Arenzville soils are in the higher positions on the landscape. They have dark buried horizons of silt loam or silty clay loam. The somewhat poorly drained Dupo and Wakeland soils are in the lower positions on the landscape. Dupo soils have dark, clayey buried horizons.

Typical pedon of Wilbur silt loam, 1,360 feet west and 450 feet south of the northeast corner of sec. 20, T. 2 S., R. 10 W.:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; few very fine roots; neutral; clear smooth boundary.

C1—8 to 16 inches; brown (10YR 4/3) silt loam; massive; friable; few very fine roots; neutral; gradual smooth boundary.

C2—16 to 24 inches; brown (10YR 4/3) silt loam; few fine distinct light brownish gray (10YR 6/2) mottles; massive; friable; few very fine roots; neutral; gradual smooth boundary.

C3—24 to 33 inches; dark yellowish brown (10YR 4/4) silt loam; few coarse distinct light brownish gray (10YR 6/2) and few medium distinct dark brown (7.5YR 4/4) mottles; massive; friable; neutral; gradual smooth boundary.

C4—33 to 43 inches; dark yellowish brown (10YR 4/4) silt loam; common coarse distinct light brownish gray (10YR 6/2) and common medium distinct dark brown (7.5YR 4/4) mottles; massive; friable; few fine dark accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

C5—43 to 60 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (10YR 6/2) mottles; massive; friable; few fine dark accumulations (iron and manganese oxides); neutral.

The A and C horizons have value of 4 or 5 and chroma of 2 to 4. The C horizon is dominantly silt loam, but in some pedons it has thin strata of loam or fine sandy loam. It ranges from medium acid to neutral.

Wirt Series

The Wirt series consists of well drained, moderately permeable soils that formed in loamy alluvium along upland streams. Slope ranges from 0 to 2 percent.

Wirt soils commonly are adjacent to Eden, Neotoma, Westmore, and Wilbur soils. Eden, Neotoma, and Westmore soils are on steep side slopes. Eden soils formed in a thin mantle of silty material and in limestone residuum. Neotoma and Westmore soils formed in loess and in sandstone or shale residuum. The moderately well drained Wilbur soils formed in silty sediments. They are at the upper ends of drainageways and in the higher positions farther from the stream channels.

Typical pedon of Wirt silt loam, 100 feet west and 200 feet south of the center of sec. 8, T. 4 S., R. 9 W.:

A—0 to 3 inches; mixed dark brown (10YR 4/3) and yellowish brown (10YR 5/4) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many fine roots; few medium round accumulations (iron and manganese oxides); mildly alkaline; abrupt smooth boundary.

Bw1—3 to 13 inches; dark brown (10YR 4/3) and yellowish brown (10YR 5/4) silt loam; common fine faint dark yellowish brown (10YR 3/4) and few fine faint brown (10YR 5/3) mottles; weak medium platy structure parting to weak fine granular; friable; common very fine roots; few fine and medium round accumulations (iron and manganese oxides); mildly alkaline; clear smooth boundary.

Bw2—13 to 21 inches; dark brown (10YR 3/3) and yellowish brown (10YR 5/4) silt loam; few fine faint pale brown (10YR 6/3) mottles; weak thick platy structure parting to weak fine granular; friable; few very fine roots; few faint very dark gray (10YR 3/1) organic coatings; few fine round accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

Bw3—21 to 26 inches; dark brown (10YR 4/3) and yellowish brown (10YR 5/4) silt loam; few fine faint pale brown (10YR 6/3) and few fine distinct dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; few very fine roots; few fine round accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2Bw4—26 to 33 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) loam; few fine faint pale brown (10YR 6/3) and common fine distinct dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; few very fine roots; few fine round accumulations (iron and manganese oxides); neutral; clear smooth boundary.

2C1—33 to 40 inches; yellowish brown (10YR 5/4) sandy loam; common fine faint grayish brown (10YR 5/2) and common fine distinct dark brown (7.5YR 4/4) mottles; single grain; very friable; common medium irregular accumulations (iron and manganese oxides); about 10 percent ferruginous and manganiferous sandstone gravel; neutral; abrupt smooth boundary.

2C2—40 to 44 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; few fine distinct strong brown (7.5YR 4/6) mottles; single grain; friable; few fine irregular accumulations (iron and manganese oxides); about 35 percent ferruginous and manganiferous sandstone gravel; neutral; abrupt smooth boundary.

2C3—44 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam; common medium distinct grayish brown (10YR 5/2) and common fine distinct strong brown (7.5YR 5/6 and 4/6) mottles; single grain; friable; few fine irregular accumulations (iron and manganese oxides); about 15 percent ferruginous and manganiferous sandstone gravel; neutral.

The solum ranges from 24 to 40 inches in thickness. The A horizon has value of 3 or 4 and chroma of 2 to 4. The Bw and 2Bw horizons are silt loam, loam, sandy loam, fine sandy loam, or very fine sandy loam. They are dominantly medium acid to neutral.

Formation of the Soils

In this section the major factors of soil formation and their degree of importance in the formation of the soils in the county are described.

Soil-forming processes act on materials deposited or accumulated by geologic agencies, such as wind, water, or glacial ice. The characteristics of the soil are determined by (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life on and in the soil, (4) the topography, and (5) the length of time the processes of soil formation have acted on the soil material (*5*).

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks or that may have been relocated by water, glaciers, or wind, slowly changing it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil profile. It may be much or little, but some time is always required for the differentiation of soil horizons. Usually, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The dominant parent materials of the soils in Monroe County are loess, glacial till, lacustrine deposits, and alluvium. A few soils formed in bedrock residuum. Some of these materials have been reworked and redeposited by subsequent actions of water and wind. Parent material determines the limits of the chemical and mineralogical composition of the soil. Although the parent materials in the county are of common glacial origin, their properties vary greatly, sometimes within small areas, depending on how the materials were deposited.

Loess, or wind-deposited silty material, is the most extensive parent material in Monroe County. The loess ranges in thickness from more than 100 feet near the bluffs to less than 10 feet on the eastern side of the county. Alford and Muren soils are examples of soils formed in loess.

Alluvial material is deposited by floodwater of present streams in recent time. Soils on bottom lands called the Great American Bottoms and along the Kaskaskia River formed in Cahokia alluvium, which has been recently deposited and varies in texture. Birds, Wakeland, and other silty soils formed along the Kaskaskia River, and clayey soils, such as Booker, and loamy soils, such as Landes, formed along the Mississippi River.

A few soils, such as Neotoma soils, formed in a thin loess mantle over material weathered from bedrock. These parent materials are not extensive and are only on deeply dissected side slopes in the uplands.

Glacial till is material laid down directly by glaciers with a minimum of water action. It is a mixture of particles of various sizes. The small pebbles in glacial till have sharp corners, a characteristic indicating that they have not been worn by water. The glacial till in Monroe County is acid and firm. It is loam, clay loam, or clay, depending on the degree of weathering. Hickory soils are an example of soils formed in glacial till. These soils typically have a subsoil of clay loam and a well developed structure.

Lacustrine materials are deposited from still, or ponded, glacial meltwater. The coarser fragments drop out of moving water as outwash; consequently, only the finer particles, such as very fine sand, silt, and clay, remain to settle out in still water. Lacustrine deposits are silty or clayey. In Monroe County soils that formed in lacustrine deposits are typically fine textured. Okaw soils are an example of soils formed in lacustrine materials.

Plant and Animal Life

Plants have been the principal organisms influencing the soils in Monroe County; however, bacteria, fungi, earthworms, and human activities have also been important. The chief contribution of plants and animals to soil formation is the addition of organic matter to the soil. The kind of organic material on and in the soil depends on the kind of plants that grew on the soil. The plant remains accumulate in the surface layer, decay, and eventually become organic matter or humus. Plant roots

provide channels for the downward movement of water through the soil and also add organic matter as they decay. Bacteria in the soil help to break down organic matter and so release nutrients that can be used by growing plants.

The native vegetation in Monroe County was mainly deciduous trees. Differences in natural soil drainage and minor variations in the parent material have affected the composition of the forest species.

Climate

Climate determines the kind of plant and animal life on and in the soil. It determines the amount of water available for the weathering of minerals and the translocation of soil material. Climate, through its influence on soil temperatures, determines the rate of chemical reaction that occurs in the soil. These influences are important, but they affect large areas rather than a relatively small area, such as a county.

The midcontinental climate in Monroe County is presumably similar to the climate that has existed during soil formation. The climate has favored the generally rapid weathering of soil material, the formation of clay, and the downward movement of clay through the profile. As a result of the translocation of clay, the subsoil in most upland soils in the county has more clay than the surface layer. More detailed information about the climate of the county is available in the section "General Nature of the County."

Topography

Relief or topography has markedly influenced the soils in Monroe County through its influence on natural drainage, erosion, plant cover, and soil temperature. Slopes range from nearly level to very steep. Natural soil drainage ranges mainly from well drained on the side slopes and ridgetops to very poorly drained in depressions.

Relief influences the formation of soils by affecting runoff and drainage; drainage in turn, through its effect on aeration of the soil, determines the color of the soil. Surface runoff is greatest on the steeper slopes. In low areas water is temporarily ponded. Water and air move freely through well drained soils but slowly through very poorly drained soils. In well aerated soils, the iron and aluminum compounds that give most soils their color are oxidized and brightly colored. Poorly aerated soils are dull gray and mottled. Alford soils are an example of well aerated, well drained soils, and Booker soils are an example of poorly aerated, very poorly drained soils.

Time

Time greatly affects the degree of profile development in a soil. The influence of time, however, can be modified by erosion, deposition of material, topography, and kind of parent material.

On the more sloping parts of the landscape, erosion may remove the surface soil material at about the same rate as the rate of soil formation. Thus, in these areas the soils are immature, or young, even though the slopes have been exposed to weathering for thousands of years. Hamburg soils are an example of young soils.

Soils on flood plains receive alluvial material during each flood. This repeated deposition slows soil formation. Haynie soils are an example of soils formed in alluvial material.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation cropping system. Growing crops in combination with needed cultural and management measures. The system includes crop rotations, conservation practices, and mechanical measures.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour farming. Farming sloping cultivated land in such a way that land preparation, planting, and cultivation are done on the contour.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Using plant residue to protect cultivated fields during critical erosion periods.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:
O horizon.—An organic layer of fresh and decaying plant residue.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified

organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipe-like cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns, and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

	SAR
Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-78 at Waterloo, Illinois)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	39.3	20.2	29.8	72	-10	61	1.82	0.69	2.76	5	3.9
February---	45.0	25.0	35.0	74	-2	62	2.20	1.05	3.18	5	3.1
March------	56.8	34.9	45.9	83	11	267	3.43	1.91	4.77	7	4.1
April------	69.2	45.6	57.4	89	25	522	3.51	1.97	4.86	8	.4
May--------	77.3	54.4	65.9	92	34	803	4.08	2.33	5.63	8	.0
June-------	85.2	63.0	74.1	96	46	1,023	3.69	1.70	5.39	7	.0
July-------	89.3	66.6	78.0	100	50	1,178	3.72	1.65	5.48	6	.0
August-----	87.2	64.5	75.9	99	50	1,113	2.78	1.30	4.05	5	.0
September--	81.2	58.0	69.6	97	39	888	3.10	1.40	4.54	5	.0
October----	71.1	46.8	59.0	90	26	596	2.46	1.13	3.59	5	.0
November---	55.8	36.4	46.1	78	12	222	3.10	1.23	4.67	6	.9
December---	43.6	26.4	35.0	72	-1	67	2.74	1.03	4.16	6	2.3
Yearly:											
Average--	66.8	45.2	56.0	---	---	---	---	---	---	---	---
Extreme--	---	---	---	102	-11	---	---	---	---	---	---
Total----	---	---	---	---	---	6,802	36.63	29.19	43.67	73	14.7

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-78 at Waterloo, Illinois)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 6	Apr. 13	May 1
2 years in 10 later than--	Apr. 1	Apr. 9	Apr. 25
5 years in 10 later than--	Mar. 23	Mar. 31	Apr. 13
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 1	Oct. 18	Oct. 7
2 years in 10 earlier than--	Nov. 7	Oct. 24	Oct. 11
5 years in 10 earlier than--	Nov. 17	Nov. 5	Oct. 19

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-78 at Waterloo, Illinois)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	216	193	165
8 years in 10	224	201	173
5 years in 10	239	218	188
2 years in 10	254	235	204
1 year in 10	262	244	212

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
5C3	Blair silty clay loam, 5 to 10 percent slopes, severely eroded	12,677	5.0
5D3	Blair silty clay loam, 10 to 15 percent slopes, severely eroded	7,807	3.1
7D3	Atlas silty clay loam, 10 to 15 percent slopes, severely eroded	2,694	1.1
7E3	Atlas silty clay loam, 15 to 20 percent slopes, severely eroded	4,484	1.8
8F	Hickory silt loam, 20 to 35 percent slopes	6,688	2.7
16	Rushville silt loam	1,791	0.7
30F	Hamburg silt loam, 20 to 30 percent slopes	302	0.1
70	Beaucoup silty clay loam	554	0.2
75B	Drury silt loam, 2 to 5 percent slopes	518	0.2
75C	Drury silt loam, 5 to 10 percent slopes	368	0.1
75D	Drury silt loam, 10 to 18 percent slopes	217	0.1
75F	Drury silt loam, 18 to 30 percent slopes	261	0.1
78	Arenzville silt loam	237	0.1
84	Okaw silt loam	268	0.1
96F	Eden flaggy silt loam, 20 to 30 percent slopes	4,417	1.8
122B	Colp silt loam, 1 to 5 percent slopes	390	0.2
122C3	Colp silty clay loam, 5 to 12 percent slopes, severely eroded	551	0.2
123	Riverwash	1,378	0.6
180	Dupo silt loam	1,996	0.8
226	Wirt silt loam	359	0.1
249	Edinburg silt loam	251	0.1
274G	Seaton silt loam, 30 to 60 percent slopes	7,812	3.1
284	Tice silty clay loam	743	0.3
302	Ambraw silty clay loam	8,690	3.5
304B	Landes very fine sandy loam, 1 to 7 percent slopes	8,001	3.2
308B	Alford silt loam, 2 to 5 percent slopes	10,126	4.0
308C2	Alford silt loam, 5 to 10 percent slopes, eroded	7,527	3.0
308D3	Alford silt loam, 10 to 15 percent slopes, severely eroded	3,140	1.3
308E3	Alford silt loam, 15 to 30 percent slopes, severely eroded	3,273	1.3
308F	Alford silt loam, 20 to 35 percent slopes	4,011	1.6
333	Wakeland silt loam	7,588	3.0
334	Birds silt loam	2,311	0.9
336	Wilbur silt loam	3,150	1.3
338B	Hurst silt loam, 1 to 7 percent slopes	715	0.3
394B	Haynie silt loam, 1 to 5 percent slopes	1,889	0.8
408	Aquents, loamy	2,784	1.1
430	Raddle silt loam	394	0.2
452A	Riley loam, 0 to 3 percent slopes	7,545	3.0
453B	Muren silt loam, 2 to 5 percent slopes	15,149	6.0
453C2	Muren silt loam, 5 to 10 percent slopes, eroded	7,291	2.9
453D3	Muren silt loam, 10 to 15 percent slopes, severely eroded	3,835	1.5
457	Booker clay	5,593	2.2
517A	Marine silt loam, 0 to 2 percent slopes	3,310	1.3
517B	Marine silt loam, 2 to 5 percent slopes	10,700	4.3
591	Fults silty clay	11,491	4.6
592	Nameoki silty clay	1,678	0.7
605F	Ursa silt loam, 20 to 35 percent slopes	1,584	0.6
621B2	Coulterville silt loam, 2 to 5 percent slopes, eroded	1,372	0.5
621C3	Coulterville silty clay loam, 5 to 10 percent slopes, severely eroded	1,014	0.4
785G	Lacrescent flaggy silt loam, 30 to 70 percent slopes	689	0.3
787	Banlic silt loam	978	0.4
802D	Orthents, loamy, rolling	501	0.2
807	Aquents-Orthents complex	3,215	1.3
864	Pits, quarries	133	0.1
988F	Westmore-Neotoma complex, 20 to 35 percent slopes	2,516	1.0
1302	Ambraw silty clay loam, wet	2,505	1.0
1457	Booker clay, wet	2,171	0.9
3092B	Sarpy fine sand, frequently flooded, 1 to 7 percent slopes	463	0.2
3302	Ambraw silty clay loam, frequently flooded	4,017	1.6
3333	Wakeland silt loam, frequently flooded	2,936	1.2
3394B	Haynie silt loam, frequently flooded, 1 to 5 percent slopes	3,541	1.4
5308C	Alford silt loam, karst, 5 to 12 percent slopes	4,626	1.8
5308E	Alford silt loam, karst, 12 to 25 percent slopes	9,637	3.9
5308G	Alford silt loam, karst, 25 to 55 percent slopes	10,076	4.0
5453B	Muren silt loam, karst, 2 to 5 percent slopes	493	0.2

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
5453C	Muren silt loam, karst, 5 to 12 percent slopes	483	0.2
6621	Coulterville Variant silt loam	1,197	0.5
7038B	Rocher loam, rarely flooded, 1 to 7 percent slopes	991	0.4
	Water	8,148	3.3
	Total	250,240	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
70	Beaucoup silty clay loam (where drained)
75B	Drury silt loam, 2 to 5 percent slopes
78	Arenzville silt loam
122B	Colp silt loam, 1 to 5 percent slopes
180	Dupo silt loam
226	Wirt silt loam
249	Edinburg silt loam (where drained)
284	Tice silty clay loam
302	Ambraw silty clay loam (where drained)
304B	Landes very fine sandy loam, 1 to 7 percent slopes
308B	Alford silt loam, 2 to 5 percent slopes
333	Wakeland silt loam (where drained)
336	Wilbur silt loam
394B	Haynie silt loam, 1 to 5 percent slopes
430	Raddle silt loam
452A	Riley loam, 0 to 3 percent slopes
453B	Muren silt loam, 2 to 5 percent slopes
457	Booker clay (where drained)
517A	Marine silt loam, 0 to 2 percent slopes (where drained)
517B	Marine silt loam, 2 to 5 percent slopes (where drained)
591	Fults silty clay (where drained)
592	Nameoki silty clay
621B2	Coulterville silt loam, 2 to 5 percent slopes, eroded (where drained)
787	Banlic silt loam (where drained)
1302	Ambraw silty clay loam, wet (where drained)
3333	Wakeland silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
5453B	Muren silt loam, karst, 2 to 5 percent slopes
6621	Coulterville Variant silt loam (where drained)
7038B	Rocher loam, rarely flooded, 1 to 7 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue-alfalfa
		Bu	Bu	Bu	Tons	AUM*
5C3---------- Blair	IVe	78	29	38	3.2	5.4
5D3---------- Blair	VIe	---	---	37	3.1	5.1
7D3---------- Atlas	VIe	---	---	15	1.7	2.8
7E3---------- Atlas	VIIe	---	---	---	1.6	2.6
8F---------- Hickory	VIe	---	---	---	---	4.0
16---------- Rushville	IIIw	72	22	29	---	---
30F---------- Hamburg	VIIe	---	---	---	---	---
70---------- Beaucoup	IIw	125	42	50	---	---
75B---------- Drury	IIe	120	40	56	4.9	8.2
75C---------- Drury	IIIe	116	39	55	4.9	7.8
75D---------- Drury	IIIe	111	37	53	4.7	7.7
75F---------- Drury	VIe	---	---	---	3.8	6.2
78---------- Arenzville	I	135	42	56	5.5	9.0
84---------- Okaw	IVw	70	21	31	---	---
96F---------- Eden	VIIe	---	---	---	---	---
122B---------- Colp	IIIe	85	32	43	3.6	6.0
122C3---------- Colp	IVe	61	24	33	2.7	4.3
123**. Riverwash						
180---------- Dupo	IIw	132	43	55	5.2	8.7

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue-alfalfa
		Bu	Bu	Bu	Tons	AUM*
226---------- Wirt	IIw	95	32	42	4.0	7.4
249---------- Edinburg	IIw	132	43	55	4.6	7.7
274G---------- Seaton	VIIe	---	---	---	---	---
284---------- Tice	I	147	47	61	5.7	9.5
302---------- Ambraw	IIw	132	43	52	4.6	7.7
304B---------- Landes	IIe	80	24	32	3.7	6.1
308B---------- Alford	IIe	126	42	51	5.1	8.6
308C2---------- Alford	IIIe	118	38	50	4.9	8.1
308D3---------- Alford	IVe	95	32	46	4.3	7.2
308E3---------- Alford	VIe	---	---	---	4.0	6.7
308F---------- Alford	VIe	---	---	---	---	5.3
333---------- Wakeland	IIw	130	44	56	5.2	8.7
334---------- Birds	Vw	---	---	---	---	---
336---------- Wilbur	I	125	44	50	4.1	8.2
338B---------- Hurst	IIIe	86	32	45	3.6	6.0
394B---------- Haynie	IIe	85	34	44	3.5	5.8
408. Aquents						
430---------- Raddle	I	145	45	59	5.8	9.7
452A---------- Riley	I	122	42	56	4.8	7.8
453B---------- Muren	IIe	120	36	50	4.1	8.2

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue-alfalfa
		Bu	Bu	Bu	Tons	AUM*
453C2---------- Muren	IIIe	113	34	47	3.6	7.2
453D3---------- Muren	IVe	97	30	42	2.5	5.0
457---------- Booker	IIIw	72	25	28	---	---
517A---------- Marine	IIw	102	30	43	3.6	7.2
517B---------- Marine	IIe	101	32	45	3.6	7.2
591---------- Fults	IIw	100	39	45	---	---
592---------- Nameoki	IIw	125	44	50	5.0	8.2
605F---------- Ursa	VIIe	---	---	---	---	2.9
621B2---------- Coulterville	IIe	99	32	42	3.7	6.1
621C3---------- Coulterville	IVe	80	26	34	3.0	4.9
785G---------- Lacrescent	VIIe	---	---	---	---	---
787---------- Banlic	IIw	115	37	46	4.2	7.0
802D. Orthents						
807. Aquents-Orthents						
864**. Pits						
988F---------- Westmore-Neotoma	VIIe	---	---	---	---	---
1302---------- Ambraw	IIIw	60	20	---	---	---
1457---------- Booker	Vw	---	---	---	---	---
3092B---------- Sarpy	IVs	---	16	---	---	---
3302---------- Ambraw	IVw	60	20	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue-alfalfa
		Bu	Bu	Bu	Tons	AUM*
3333---------- Wakeland	IIIw	60	25	---	---	---
3394B---------- Haynie	IIIw	60	20	26	---	---
5308C---------- Alford	IIIe	105	38	44	3.6	7.6
5308E---------- Alford	VIe	---	---	---	2.8	6.7
5308G---------- Alford	VIIe	---	---	---	---	---
5453B---------- Muren	IIe	110	33	46	4.1	7.8
5453C---------- Muren	IIIe	105	37	42	3.8	7.1
6621---------- Coulterville Variant	IIIw	95	30	40	---	---
7038B---------- Rocher	IIe	97	20	30	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
7E3---------- Atlas	4R	Moderate	Moderate	Moderate	Moderate	White oak----------	70	52	Green ash, pin oak, red maple, Austrian pine.
						Northern red oak----	70	52	
						Bur oak----------	70	---	
						Green ash----------	---	---	
8F---------- Hickory	5R	Moderate	Moderate	Slight	Slight	White oak----------	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak----	85	67	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory---	---	---	
						Yellow-poplar-------	95	98	
75F---------- Drury	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	95	98	Yellow-poplar, white oak, northern red oak, sweetgum, black walnut, eastern white pine, loblolly pine, shortleaf pine.
						White oak----------	85	67	
						Northern red oak----	85	67	
						Sweetgum----------	---	---	
						Green ash----------	---	---	
96F---------- Eden	4C	Moderate	Moderate	Moderate	Moderate	Black oak----------	68	50	Northern red oak, white oak, white ash, eastern white pine, eastern redcedar, Virginia pine.
						White oak----------	61	44	
						White ash----------	60	51	
						Scarlet oak---------	68	50	
						Black walnut--------	74	---	
						Eastern redcedar----	42	---	
226---------- Wirt	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	95	98	Eastern white pine, black walnut, yellow-poplar, black locust.
274G---------- Seaton	6R	Severe	Severe	Severe	Slight	Yellow-poplar-------	90	90	White oak, black walnut, northern red oak, green ash, red pine, sugar maple.
						White oak----------	90	72	
						Northern red oak----	80	62	
						Black walnut--------	---	---	
308E3---------- Alford	4A	Slight	Slight	Slight	Slight	White oak----------	90	72	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
						Yellow-poplar-------	98	104	
						Sweetgum----------	76	70	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
308F---------- Alford	4R	Moderate	Moderate	Slight	Slight	White oak---------- Yellow-poplar------- Sweetgum----------	90 98 76	72 104 70	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
334---------- Birds	4W	Slight	Severe	Moderate	Moderate	Pin oak---------- Eastern cottonwood-- Sweetgum---------- Cherrybark oak------ American sycamore---	90 100 --- --- ---	72 128 --- --- ---	Eastern cottonwood, red maple, American sycamore, baldcypress, water tupelo.
605F---------- Ursa	4R	Moderate	Moderate	Moderate	Slight	White oak---------- Northern red oak---- Black oak---------- Green ash----------	70 70 70 ---	52 52 52 ---	Austrian pine, green ash, red maple, eastern redcedar, pin oak.
785G---------- Lacrescent	3R	Severe	Severe	Slight	Moderate	Northern red oak---- White oak---------- American basswood---	55 55 55	38 38 35	Eastern white pine, white oak, American basswood, northern red oak, red pine.
988F**: Westmore------- Neotoma--------	3R 5R	Moderate Moderate	Moderate Moderate	Moderate Slight	Slight Slight	Northern red oak---- White ash---------- Black walnut-------- Yellow-poplar------- Northern red oak---- Yellow-poplar------- White oak---------- Black cherry-------- Sugar maple--------- White ash---------- Black walnut--------	65 --- --- 80 85 105 --- --- --- --- ---	48 --- --- 78 67 115 --- --- --- --- ---	Eastern white pine, northern red oak, yellow-poplar, white ash, red pine, white oak. Eastern white pine, northern red oak, yellow-poplar, white ash, red pine, white oak.
3394B---------- Haynie	11A	Slight	Slight	Slight	Slight	Eastern cottonwood-- American sycamore--- Black walnut-------- Green ash----------	110 110 --- ---	156 --- --- ---	Black walnut, eastern cottonwood.
5308E---------- Alford	5R	Moderate	Moderate	Slight	Slight	White oak---------- Yellow-poplar------- Sweetgum----------	90 98 76	72 104 70	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
5308G---------- Alford	5R	Severe	Severe	Slight	Slight	White oak----------	90	72	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
						Yellow-poplar-------	98	104	
						Sweetgum----------	76	70	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
5C3, 5D3---------- Blair	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
7D3, 7E3---------- Atlas	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
8F---------- Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
16---------- Rushville	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
30F---------- Hamburg	Osageorange, Russian-olive, eastern redcedar, Washington hawthorn.	Honeylocust, northern catalpa, bur oak, black locust, green ash.	Siberian elm----------	---
70---------- Beaucoup	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
75B, 75C, 75D, 75F---------- Drury	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
78---------- Arenzville	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Blue spruce, Austrian pine, Washington hawthorn, white fir, northern white-cedar.	Norway spruce---------	Pin oak, eastern white pine.
84---------- Okaw	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
96F---------- Eden	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
122B, 122C3------- Colp	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
123*. Riverwash				
180---------- Dupo	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
226---------- Wirt	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
249---------- Edinburg	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
274G---------- Seaton	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
284---------- Tice	Silky dogwood, autumn-olive.	Amur maple, Russian-olive, baldcypress.	Eastern white pine, Norway spruce.	Eastern cottonwood, American sycamore, red maple.
302---------- Ambraw	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
304B---------- Landes	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
308B, 308C2, 308D3, 308E3, 308F---------- Alford	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
333---------- Wakeland	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	---	Eastern white pine, pin oak.
334---------- Birds	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
336---------- Wilbur	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
338B---------- Hurst	Washington hawthorn, Amur privet, arrowwood, Tatarian honeysuckle, Amur honeysuckle, eastern redcedar, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
394B. Haynie				
408. Aquents				
430---------- Raddle	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
452A---------- Riley	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce---------	Pin oak, eastern white pine.
453B, 453C2, 453D3---------- Muren	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
457---------- Booker	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
517A, 517B-------- Marine	Eastern redcedar, American cranberrybush, Amur privet, Washington hawthorn, Amur honeysuckle, autumn-olive, Tatarian honeysuckle.	Austrian pine, green ash, eastern white pine, osageorange.	Pin oak----------	---
591---------- Fults	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Blue spruce, Norway spruce, northern white-cedar, Austrian pine, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
592---------- Nameoki	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Blue spruce, northern white-cedar, Austrian pine, white fir, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
605F---------- Ursa	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
621B2, 621C3------ Coulterville	Blackhaw, nannyberry viburnum, Washington hawthorn, Tatarian honeysuckle.	Eastern redcedar, northern white-cedar, white spruce, hackberry, green ash, osageorange.	Black willow----------	---
785G. Lacrescent				
787---------- Banlic	Amur privet, arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
802D. Orthents				
807*: Aquents.				
Orthents.				

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
864*. Pits				
988F*: Westmore	Eastern redcedar, Washington hawthorn, Tatarian honeysuckle, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
Neotoma.				
1302--- Ambraw	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
1457--- Booker	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
3092B--- Sarpy	Tatarian honeysuckle, Siberian peashrub.	Osageorange, northern white-cedar, white spruce, nannyberry viburnum, eastern redcedar, Washington hawthorn, green ash.	Black willow----------	Eastern cottonwood.
3302--- Ambraw	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
3333--- Wakeland	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	---	Eastern white pine, pin oak.
3394B. Haynie				
5308C, 5308E, 5308G--- Alford	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
5453B, 5453C------ Muren	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
6621---------- Coulterville Variant	Eastern redcedar, Russian-olive.	Siberian elm, green ash.	---	---
7038B---------- Rocher	Blackhaw, Tatarian honeysuckle, Siberian peashrub.	Eastern redcedar, northern white-cedar, nannyberry viburnum, Washington hawthorn, green ash, hackberry, osageorange, Russian-olive.	Honeylocust----------	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
5C3 Blair	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness.
5D3 Blair	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
7D3 Atlas	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: wetness.	Severe: wetness.
7E3 Atlas	Severe: slope, wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: wetness.	Severe: wetness, slope.
8F Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
16 Rushville	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
30F Hamburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
70 Beaucoup	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
75B Drury	Slight	Slight	Moderate: slope.	Slight	Slight.
75C Drury	Slight	Slight	Severe: slope.	Slight	Slight.
75D Drury	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
75F Drury	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
78 Arenzville	Severe: flooding.	Slight	Slight	Slight	Slight.
84 Okaw	Severe: flooding, ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
96F Eden	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
122B---------- Colp	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Slight.
122C3---------- Colp	Moderate: slope, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
123*. Riverwash					
180---------- Dupo	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
226---------- Wirt	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
249---------- Edinburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
274G---------- Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
284---------- Tice	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
302---------- Ambraw	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
304B---------- Landes	Severe: flooding.	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
308B---------- Alford	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
308C2---------- Alford	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
308D3---------- Alford	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
308E3---------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
308F---------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
333---------- Wakeland	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
334---------- Birds	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
336---------- Wilbur	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight----------	Moderate: wetness.
338B---------- Hurst	Severe: flooding, wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
394B---------- Haynie	Severe: flooding.	Slight----------	Moderate: slope.	Slight----------	Slight.
408. Aquents					
430---------- Raddle	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
452A---------- Riley	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
453B---------- Muren	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight----------	Slight.
453C2---------- Muren	Moderate: wetness.	Moderate: wetness.	Severe: slope.	Slight----------	Slight.
453D3---------- Muren	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
457---------- Booker	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
517A, 517B---------- Marine	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
591---------- Fults	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.
592---------- Nameoki	Severe: flooding, wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
605F---------- Ursa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
621B2---------- Coulterville	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
621C3---------- Coulterville	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
785G---------- Lacrescent	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
787---------- Banlic	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
802D. Orthents					
807*: Aquents.					
Orthents.					
864*. Pits					
988F*: Westmore----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Neotoma----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
1302---------- Ambraw	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
1457---------- Booker	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.	Severe: ponding, flooding, too clayey.
3092B---------- Sarpy	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy, flooding.	Severe: too sandy.	Severe: flooding.
3302---------- Ambraw	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
3333---------- Wakeland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: flooding, wetness.	Severe: flooding.
3394B---------- Haynie	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
5308C---------- Alford	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
5308E---------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
5308G---------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
5453B---------- Muren	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight----------	Slight.
5453C---------- Muren	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
6621---------- Coulterville Variant	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
7038B---------- Rocher	Severe: flooding.	Slight----------	Moderate: slope.	Slight----------	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
5C3, 5D3---------- Blair	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
7D3---------- Atlas	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
7E3---------- Atlas	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
8F---------- Hickory	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
16---------- Rushville	Poor	Fair	Poor	Fair	Good	Good	Poor	Fair	Good.
30F---------- Hamburg	Very poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
70---------- Beaucoup	Good	Good	Good	Fair	Good	Good	Good	Good	Good.
75B---------- Drury	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
75C, 75D---------- Drury	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
75F---------- Drury	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
78---------- Arenzville	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
84---------- Okaw	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
96F---------- Eden	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
122B---------- Colp	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
122C3---------- Colp	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
123*. Riverwash									
180---------- Dupo	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
226---------- Wirt	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
249---------- Edinburg	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
274G---------- Seaton	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
284---------- Tice	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
302---------- Ambraw	Good	Fair	Good	Good	Good	Good	Good	Good	Good.
304B---------- Landes	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
308B---------- Alford	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
308C2, 308D3------- Alford	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
308E3---------- Alford	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
308F---------- Alford	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
333---------- Wakeland	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
334---------- Birds	Good	Fair	Good	Good	Good	Good	Good	Good	Good.
336---------- Wilbur	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
338B---------- Hurst	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
394B---------- Haynie	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
408. Aquents									
430---------- Raddle	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
452A---------- Riley	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
453B, 453C2, 453D3- Muren	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
457---------- Booker	Poor	Poor	Fair	Poor	Poor	Good	Poor	Poor	Fair.
517A---------- Marine	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
517B---------- Marine	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
591---------- Fults	Fair	Fair	Poor	Fair	Good	Fair	Fair	Fair	Fair.
592---------- Nameoki	Fair	Good	Fair	Good	Poor	Good	Fair	Good	Fair.
605F---------- Ursa	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
621B2---------- Coulterville	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
621C3---------- Coulterville	Fair	Good	Good	Good	Poor	Fair	Good	Good	Fair.
785G---------- Lacrescent	Poor	Poor	Fair	Good	Very poor	Very poor	Poor	Good	Very poor.
787---------- Banlic	Fair	Good	Good	Good	Fair	Good	Good	Good	Fair.
802D. Orthents									
807*: Aquents.									
Orthents.									
864*. Pits									
988F*: Westmore----------	Very poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Neotoma----------	Very poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
1302---------- Ambraw	Good	Fair	Good	Good	Good	Good	Good	Good	Good.
1457---------- Booker	Poor	Poor	Fair	Poor	Poor	Good	Poor	Poor	Fair.
3092B---------- Sarpy	Poor	Poor	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
3302---------- Ambraw	Good	Fair	Good	Good	Good	Good	Good	Good	Good.
3333---------- Wakeland	Poor	Fair	Fair	Good	Fair	Fair	Fair	Good	Fair.
3394B---------- Haynie	Fair	Fair	Fair	Good	Poor	Poor	Fair	Fair	Poor.
5308C---------- Alford	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
5308E---------- Alford	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
5308G---------- Alford	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
5453B, 5453C------- Muren	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
6621---------- Coulterville Variant	Poor	Fair	Poor	Fair	Good	Good	Poor	Fair	Good.
7038B---------- Rocher	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
5C3---------- Blair	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
5D3---------- Blair	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
7D3---------- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, wetness.	Severe: wetness.
7E3---------- Atlas	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, wetness, slope.	Severe: wetness, slope.
8F---------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
16---------- Rushville	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
30F---------- Hamburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
70---------- Beaucoup	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding.	Severe: ponding.
75B---------- Drury	Slight---------	Slight---------	Slight---------	Slight---------	Severe: low strength, frost action.	Slight.
75C---------- Drury	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength, frost action.	Slight.
75D---------- Drury	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
75F---------- Drury	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
78---------- Arenzville	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
84---------- Okaw	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding.
96F---------- Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: large stones, slope.
122B---------- Colp	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: low strength, frost action.	Slight.
122C3---------- Colp	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: slope.
123*. Riverwash						
180---------- Dupo	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness, shrink-swell.	Severe: flooding.	Severe: low strength, frost action.	Moderate: wetness.
226---------- Wirt	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
249---------- Edinburg	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding.	Severe: ponding.
274G---------- Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
284---------- Tice	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, frost action.	Moderate: wetness.
302---------- Ambraw	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
304B---------- Landes	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: droughty.
308B---------- Alford	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
308C2-------- Alford	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
308D3---------- Alford	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
308E3, 308F---- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
333---------- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
334---------- Birds	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
336---------- Wilbur	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: frost action.	Moderate: wetness.
338B---------- Hurst	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
394B---------- Haynie	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
408. Aquents						
430---------- Raddle	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.
452A---------- Riley	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, frost action.	Moderate: wetness.
453B---------- Muren	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
453C2---------- Muren	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
453D3---------- Muren	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
457---------- Booker	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, too clayey.
517A, 517B-------- Marine	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
591---------- Fults	Severe: cutbanks cave, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness.
592---------- Nameoki	Severe: cutbanks cave, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, frost action.	Severe: too clayey.
605F---------- Ursa	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
621B2, 621C3------ Coulterville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
785G---------- Lacrescent	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
787---------- Banlic	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness.
802D. Orthents						
807*: Aquents.						
Orthents.						
864*. Pits						
988F*: Westmore---------	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, low strength, frost action.	Severe: slope.
Neotoma----------	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
1302---------- Ambraw	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding.	Severe: ponding.
1457---------- Booker	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, too clayey.
3092B---------- Sarpy	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3302---------- Ambraw	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
3333---------- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
3394B---------- Haynie	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
5308C---------- Alford	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
5308E, 5308G------ Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
5453B---------- Muren	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
5453C---------- Muren	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
6621---------- Coulterville Variant	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
7038B---------- Rocher	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
5C3---------- Blair	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
5D3---------- Blair	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope, wetness.
7D3---------- Atlas	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
7E3---------- Atlas	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: wetness, slope.	Poor: too clayey, hard to pack, slope.
8F---------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
16---------- Rushville	Severe: ponding, percs slowly.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
30F---------- Hamburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
70---------- Beaucoup	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
75B---------- Drury	Slight----------	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
75C---------- Drury	Slight----------	Severe: slope.	Slight----------	Slight----------	Good.
75D---------- Drury	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
75F---------- Drury	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
78---------- Arenzville	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
84---------- Okaw	Severe: flooding, ponding, percs slowly.	Severe: flooding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
96F---------- Eden	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
122B---------- Colp	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
122C3---------- Colp	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
123*. Riverwash					
180---------- Dupo	Severe: wetness, percs slowly.	Slight----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
226---------- Wirt	Severe: flooding.	Severe: seepage, flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Good.
249---------- Edinburg	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
274G---------- Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
284---------- Tice	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
302---------- Ambraw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
304B---------- Landes	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
308B---------- Alford	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
308C2---------- Alford	Slight----------	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
308D3---------- Alford	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
308E3, 308F--------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
333---------- Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
334---------- Birds	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
336---------- Wilbur	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
338B---------- Hurst	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
394B---------- Haynie	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
408. Aquents					
430---------- Raddle	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
452A---------- Riley	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
453B---------- Muren	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
453C2---------- Muren	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
453D3---------- Muren	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope, wetness.
457---------- Booker	Severe: flooding, ponding, percs slowly.	Slight----------	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
517A---------- Marine	Severe: wetness, percs slowly.	Slight----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
517B---------- Marine	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
591---------- Fults	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
592---------- Nameoki	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
605F---------- Ursa	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
621B2---------- Coulterville	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
621C3---------- Coulterville	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
785G---------- Lacrescent	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
787---------- Banlic	Severe: wetness, percs slowly.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
802D. Orthents					
807*: Aquents.					
Orthents.					
864*. Pits					
988F*: Westmore----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey, hard to pack.
Neotoma----------	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
1302---------- Ambraw	Severe: ponding.	Severe: ponding.	Severe: ponding, too sandy.	Severe: ponding.	Poor: too sandy, ponding.
1457---------- Booker	Severe: flooding, ponding, percs slowly.	Slight----------	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
3092B---------- Sarpy	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
3302---------- Ambraw	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, too sandy.	Severe: flooding, ponding.	Poor: too sandy, ponding.
3333---------- Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3394B---------- Haynie	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
5308C---------- Alford	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
5308E, 5308G-------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
5453B---------- Muren	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
5453C---------- Muren	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope, wetness.
6621---------- Coulterville Variant	Severe: ponding, percs slowly.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, ponding.
7038B---------- Rocher	Moderate: flooding.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Fair: too sandy, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
5C3---------- Blair	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
5D3---------- Blair	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
7D3---------- Atlas	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
7E3---------- Atlas	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness, slope.
8F---------- Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
16---------- Rushville	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
30F---------- Hamburg	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
70---------- Beaucoup	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
75B, 75C---------- Drury	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
75D---------- Drury	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
75F---------- Drury	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
78---------- Arenzville	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
84---------- Okaw	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
96F---------- Eden	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
122B, 122C3---------- Colp	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
123*. Riverwash				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
180--- Dupo	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
226--- Wirt	Good---	Improbable: excess fines.	Improbable: excess fines.	Good.
249--- Edinburg	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
274G--- Seaton	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
284--- Tice	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
302--- Ambraw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
304B--- Landes	Good---	Probable---	Improbable: too sandy.	Poor: thin layer.
308B, 308C2--- Alford	Good---	Improbable: excess fines.	Improbable: excess fines.	Good.
308D3--- Alford	Good---	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
308E3--- Alford	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
308F--- Alford	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
333--- Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
334--- Birds	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
336--- Wilbur	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
338B--- Hurst	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
394B--- Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
408. Aquents				
430--- Raddle	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
452A---------- Riley	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: thin layer.
453B, 453C2---------- Muren	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
453D3---------- Muren	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
457---------- Booker	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
517A, 517B---------- Marine	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
591---------- Fults	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: wetness.
592---------- Nameoki	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
605F---------- Ursa	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
621B2---------- Coulterville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
621C3---------- Coulterville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
785G---------- Lacrescent	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
787---------- Banlic	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
802D. Orthents				
807*: Aquents.				
Orthents.				
864*. Pits				
988F*: Westmore----------	Poor: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Neotoma----------	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1302 Ambraw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
1457 Booker	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
3092B Sarpy	Good	Probable	Improbable: too sandy.	Poor: too sandy.
3302 Ambraw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
3333 Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
3394B Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
5308C Alford	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
5308E Alford	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
5308G Alford	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
5453B Muren	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
5453C Muren	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
6621 Coulterville Variant	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
7038B Rocher	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
5C3---------- Blair	Moderate: seepage, slope.	Severe: wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
5D3---------- Blair	Severe: slope.	Severe: wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
7D3, 7E3---------- Atlas	Severe: slope.	Severe: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, wetness.	Wetness, slope.
8F---------- Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
16---------- Rushville	Slight---------	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
30F---------- Hamburg	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
70---------- Beaucoup	Slight---------	Severe: ponding.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
75B, 75C---------- Drury	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
75D, 75F---------- Drury	Severe: slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
78---------- Arenzville	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
84---------- Okaw	Slight---------	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
96F---------- Eden	Severe: slope.	Severe: hard to pack, large stones.	Deep to water	Large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
122B---------- Colp	Moderate: slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
122C3---------- Colp	Severe: slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
123*. Riverwash						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
180---------- Dupo	Moderate: seepage.	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
226---------- Wirt	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
249---------- Edinburg	Moderate: seepage.	Severe: hard to pack, ponding.	Percs slowly, ponding, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
274G---------- Seaton	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
284---------- Tice	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness--------	Wetness--------	Favorable.
302---------- Ambraw	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness--------	Wetness--------	Wetness.
304B---------- Landes	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy------	Droughty.
308B, 308C2------- Alford	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
308D3, 308E3, 308F---------- Alford	Severe: slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
333---------- Wakeland	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
334---------- Birds	Slight---------	Severe: ponding.	Ponding, flooding, frost action.	Ponding, erodes easily, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
336---------- Wilbur	Moderate: seepage.	Severe: piping, wetness.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
338B---------- Hurst	Moderate: slope.	Severe: wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
394B---------- Haynie	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
408. Aquents						
430---------- Raddle	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
452A---------- Riley	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action---	Wetness, rooting depth.	Wetness, too sandy.	Rooting depth.
453B, 453C2------- Muren	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
453D3---------- Muren	Severe: slope.	Moderate: thin layer, piping, wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
457---------- Booker	Slight---------	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
517A---------- Marine	Slight---------	Moderate: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
517B---------- Marine	Moderate: slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
591---------- Fults	Severe: seepage.	Severe: wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
592---------- Nameoki	Moderate: seepage.	Severe: piping, wetness.	Percs slowly, frost action.	Wetness, slow intake, percs slowly.	Wetness--------	Wetness, percs slowly.
605F---------- Ursa	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, erodes easily, percs slowly.	Slope, erodes easily.
621B2, 621C3------ Coulterville	Moderate: slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
785G---------- Lacrescent	Severe: seepage, slope.	Severe: seepage, piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
787---------- Banlic	Slight---------	Severe: piping.	Percs slowly, frost action.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
802D. Orthents						
807*: Aquents.						
Orthents.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
864*. Pits						
988F*: Westmore	Severe: slope.	Moderate: hard to pack.	Deep to water	Erodes easily, percs slowly, slope.	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.
Neotoma	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
1302 Ambraw	Slight	Severe: piping, ponding.	Ponding, frost action.	Ponding	Ponding, too sandy.	Wetness.
1457 Booker	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
3092B Sarpy	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
3302 Ambraw	Slight	Severe: piping, ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding, too sandy.	Wetness.
3333 Wakeland	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
3394B Haynie	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily, flooding.	Erodes easily	Erodes easily.
5308C, 5308E, 5308G Alford	Severe: slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
5453B Muren	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
5453C Muren	Severe: slope.	Moderate: thin layer, piping, wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
6621 Coulterville Variant	Slight	Severe: ponding.	Percs slowly, frost action.	Ponding, percs slowly, rooting depth.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, rooting depth.
7038B Rocher	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
5C3, 5D3---	0-5	Silty clay loam	CL	A-6	0-5	95-100	90-100	90-100	75-90	25-40	10-20
Blair	5-20	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	90-100	70-90	30-50	15-30
	20-60	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	85-100	70-90	30-50	15-30
7D3, 7E3---	0-9	Silty clay loam	CH, CL	A-7	0	100	100	95-100	75-95	45-65	30-40
Atlas	9-60	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	80-95	50-70	30-45
8F---	0-9	Silt loam---	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
Hickory	9-42	Clay loam, silty clay loam.	CL	A-6, A-7	0-5	95-100	90-100	80-95	65-80	30-50	15-30
	42-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	80-95	80-95	60-80	20-40	5-20
16---	0-8	Silt loam---	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
Rushville	8-19	Silt loam, silt	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-40	NP-15
	19-43	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	95-100	45-60	20-40
	43-52	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	95-100	45-60	15-30
	52-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-20
30F---	0-4	Silt loam---	CL-ML, ML	A-4	0	100	100	100	95-100	<25	NP-5
Hamburg	4-60	Silt loam, very fine sandy loam, silt.	CL-ML, ML	A-4	0	100	100	100	95-100	<25	NP-5
70---	0-16	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-100	30-45	15-25
Beaucoup	16-46	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-100	30-45	15-30
	46-60	Stratified very fine sandy loam to silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	100	90-100	65-95	25-45	5-25
75B, 75C, 75D, 75F---	0-7	Silt loam---	CL, CL-ML	A-4, A-6	0	100	100	100	90-100	25-35	5-15
Drury	7-60	Silt loam---	CL	A-6, A-4	0	100	100	95-100	90-100	25-35	8-15
78---	0-27	Silt loam---	ML, CL-ML, CL	A-4	0	100	100	95-100	80-95	20-30	4-10
Arenzville	27-44	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-95	30-45	10-20
	44-60	Silt loam---	CL, CL-ML	A-4	0	75-100	75-100	75-100	70-95	20-30	5-10
84---	0-17	Silt loam---	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
Okaw	17-60	Silty clay, clay, silty clay loam.	CH	A-7	0	100	95-100	95-100	85-100	50-70	30-50
96F---	0-3	Flaggy silt loam	CL, CH	A-7, A-6	25-40	75-95	70-95	70-95	65-95	35-65	12-35
Eden	3-24	Flaggy silty clay, very flaggy silty clay, extremely flaggy silty clay.	CH, CL	A-7	10-90	75-100	55-100	50-100	50-95	45-75	20-45
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
122B---------- Colp	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	8-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	5-15
	12-48	Silty clay loam, silt loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	48-60	Stratified silty clay loam to silty clay.	CL, CH	A-6, A-7	0	100	100	95-100	85-100	35-55	15-30
122C3---------- Colp	0-9	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	9-35	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	5-15
	35-60	Silty clay loam, silt loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
123*. Riverwash											
180---------- Dupo	0-16	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	1-15
	16-34	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	5-15
	34-60	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	100	98-100	35-55	15-30
226---------- Wirt	0-13	Silt loam--------	CL-ML, ML	A-4	0	95-100	90-100	80-100	65-90	<25	3-7
	13-33	Silt loam, loam	CL-ML, ML	A-4	0	95-100	90-100	75-100	55-90	<25	3-7
	33-60	Stratified loam to gravelly sandy loam.	SM, SM-SC, ML, CL-ML	A-4, A-2, A-1-b	0	85-100	50-100	40-95	20-75	<25	NP-7
249---------- Edinburg	0-19	Silt loam, silty clay loam.	CL	A-7, A-6	0	100	100	98-100	90-100	35-50	16-25
	19-49	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	98-100	90-100	45-70	28-45
	49-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	98-100	90-100	35-45	15-20
274G---------- Seaton	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	5-15
	6-60	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	25-40	5-20
284---------- Tice	0-15	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	10-20
	15-60	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	15-30
302---------- Ambraw	0-11	Silty clay loam	CL	A-6, A-7	0	100	100	85-95	70-95	30-45	10-20
	11-34	Clay loam, sandy clay loam.	CL	A-7, A-6	0	100	100	85-95	50-85	30-50	10-25
	34-60	Stratified silty clay loam to sandy loam.	SC, ML, CL, SM	A-6, A-4	0	100	90-100	80-90	40-80	20-40	NP-17
304B---------- Landes	0-39	Very fine sandy loam.	SM, SC, SM-SC	A-4, A-2	0	100	70-100	70-95	20-50	<25	NP-10
	39-60	Loamy very fine sand.	SM, SP-SM, SC, SM-SC	A-2, A-4	0	100	85-100	70-95	10-50	<30	NP-10
308B---------- Alford	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
	10-51	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
	51-60	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	100	90-100	70-100	<25	NP-10

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
308C2, 308D3, 308E3, 308F----- Alford	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
	8-60	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
333---------- Wakeland	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-60	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
334---------- Birds	0-36	Silt loam--------	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
	36-60	Stratified silt loam to silty clay loam.	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
336---------- Wilbur	0-8	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	70-90	<25	3-7
	8-60	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	70-90	<25	3-7
338B---------- Hurst	0-16	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-35	6-15
	16-60	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
394B---------- Haynie	0-15	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
	15-60	Silt loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
408. Aquents											
430---------- Raddle	0-19	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	85-100	25-35	8-15
	19-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	20-30	4-14
452A---------- Riley	0-11	Loam-------------	CL	A-6	0	100	100	90-100	80-100	30-40	10-20
	11-33	Sandy clay loam, clay loam, sandy loam.	CL, SC	A-6, A-7	0	100	100	90-100	40-85	35-50	15-25
	33-60	Loamy fine sand, sand, loamy sand.	SM, SM-SC, SP-SM	A-2, A-4	0	100	100	90-100	10-40	<25	NP-7
453B---------- Muren	0-14	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-30	5-15
	14-43	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
	43-60	Silt loam, silt	CL, CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-10
453C2, 453D3----- Muren	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-30	5-15
	8-37	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
	37-60	Silt loam, silt	CL, CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-10
457---------- Booker	0-13	Clay-------------	CL, CH	A-7	0	100	100	95-100	95-100	45-75	30-45
	13-60	Clay-------------	CH	A-7	0	100	100	100	95-100	65-85	40-55
517A, 517B------- Marine	0-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-35	5-15
	12-42	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	95-100	40-60	20-35
	42-60	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	95-100	80-100	30-45	8-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
591---------- Fults	0-12	Silty clay-------	CL, CH	A-7	0	100	100	100	95-100	45-65	20-40
	12-32	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	45-65	20-40
	32-42	Silty clay loam, sandy clay loam, sandy loam.	ML, SM	A-4, A-6, A-7	0	100	95-100	80-95	40-85	30-50	5-20
	42-60	Sandy loam, loamy sand, fine sand.	ML, SW-SM, SM, SP-SM	A-2, A-4, A-3	0	100	90-100	60-100	5-60	25-35	NP-10
592---------- Nameoki	0-14	Silty clay-------	CL, CH	A-7	0	100	100	100	90-100	45-65	20-40
	14-30	Silty clay, silty clay loam, clay.	CL, CH	A-7	0	100	100	95-100	85-100	45-65	20-40
	30-56	Silt loam, clay loam, silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	100	95-100	80-95	40-85	25-40	5-15
	56-60	Very fine sand, sandy loam, silty clay loam.	ML, CL, SM, SC	A-2, A-4, A-6	0	100	90-100	60-90	5-80	20-40	NP-15
605F---------- Ursa	0-11	Silt loam, loam	CL, CL-ML	A-6, A-4	0	100	95-100	90-100	80-100	20-40	5-20
	11-60	Clay, clay loam, silty clay.	CH, CL	A-7	0-5	95-100	90-95	70-90	55-90	40-60	20-35
621B2---------- Coulterville	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-20
	7-23	Silty clay loam, silt loam.	ML, CL, CH, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	23-56	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-50	7-25
	56-60	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0	100	100	90-100	80-95	25-45	5-25
621C3---------- Coulterville	0-9	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	9-60	Silty clay loam, silt loam.	ML, CL, CH, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
785G---------- Lacrescent	0-18	Flaggy silt loam	CL	A-6, A-7	15-30	80-100	70-100	60-95	50-90	30-45	10-20
	18-60	Cobbly loam, extremely flaggy silt loam, very cobbly fine sandy loam.	SM, SC, ML, CL	A-4, A-6, A-2, A-1	50-65	50-75	40-65	35-60	15-55	10-35	NP-12
787---------- Banlic	0-14	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-95	20-30	3-10
	14-33	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	90-100	85-95	20-30	3-10
	33-60	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	95-100	90-100	85-95	20-30	3-10
802D. Orthents											
807*: Aquents.											
Orthents.											
864*. Pits											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
988F*:											
Westmore	0-10	Silt loam	ML, CL-ML, CL	A-4	0	100	90-100	80-100	70-95	22-35	4-10
	10-22	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0-5	95-100	90-100	85-100	80-90	30-50	11-20
	22-60	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-15	80-100	65-95	60-90	55-90	38-70	18-40
Neotoma	0-3	Flaggy silt loam	ML, GM, SM, GC	A-4	10-30	55-80	50-75	40-70	40-65	22-35	3-10
	3-60	Very flaggy silt loam, extremely flaggy sandy loam, extremely flaggy loam.	GM	A-2, A-4	40-85	40-65	35-60	30-50	25-45	<35	NP-8
1302	0-12	Silty clay loam	CL, ML	A-6, A-7	0	100	100	85-95	70-95	30-45	10-20
Ambraw	12-33	Stratified silty clay to sandy clay loam.	CL, ML	A-6, A-7	0	100	100	85-95	50-85	30-50	10-25
	33-60	Stratified silty clay loam to sand.	SC, ML, SM, CL	A-6, A-4, A-2	0	100	90-100	80-90	30-80	15-40	NP-17
1457	0-16	Clay	CL, CH	A-7	0	100	100	95-100	95-100	45-75	30-45
Booker	16-60	Clay	CH	A-7	0	100	100	100	95-100	65-85	40-55
3092B	0-9	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	60-80	2-15	---	NP
Sarpy	9-60	Fine sand, loamy fine sand, sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	60-80	2-35	---	NP
3302	0-6	Silty clay loam	CL, ML	A-6, A-7	0	100	100	85-95	70-95	30-45	10-20
Ambraw	6-60	Stratified silty clay loam to sand.	SC, ML, SM, CL	A-6, A-4, A-2	0	100	90-100	80-90	30-80	15-40	NP-17
3333	0-12	Silt loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
Wakeland	12-60	Silt loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
3394B	0-10	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
Haynie	10-60	Silt loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
5308C, 5308E, 5308G	0-6	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
Alford	6-55	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
	55-60	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	100	90-100	70-100	<25	NP-10
5453B, 5453C	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-30	5-15
Muren	9-52	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
	52-60	Silt loam, silt	CL, CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-10

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
6621----------	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	20-35	5-15
Coulterville Variant	9-12	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	15-30	3-15
	12-39	Silt loam, silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	15-30
	39-60	Loam, silt loam, silty clay loam.	CL	A-6	0	95-100	90-100	80-100	65-100	20-35	10-20
7038B----------	0-10	Loam----------	CL-ML, CL	A-4, A-6	0	100	100	95-100	50-85	<25	5-15
Rocher	10-60	Very fine sandy loam, loamy very fine sand, silt loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	50-85	<25	NP-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
5C3, 5D3--------- Blair	0-5 5-20 20-60	27-35 25-35 25-35	1.40-1.60 1.45-1.60 1.45-1.60	0.2-0.6 0.2-0.6 0.2-0.6	0.16-0.21 0.16-0.21 0.16-0.21	5.1-7.3 4.5-6.0 5.1-7.8	Moderate------ Moderate------ Moderate------	0.37 0.37 0.37	3	6	.5-1
7D3, 7E3--------- Atlas	0-9 9-60	30-40 35-45	1.45-1.65 1.50-1.70	0.06-0.2 <0.06	0.18-0.20 0.09-0.13	4.5-7.3 4.5-7.8	High--------- High---------	0.32 0.32	2	7	.5-2
8F--------------- Hickory	0-9 9-42 42-60	19-25 27-35 15-32	1.30-1.50 1.45-1.65 1.50-1.70	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.22 0.15-0.19 0.11-0.19	4.5-7.3 4.5-6.0 5.1-8.4	Low---------- Moderate------ Low----------	0.37 0.37 0.37	5	6	1-2
16--------------- Rushville	0-8 8-19 19-43 43-52 52-60	15-27 10-22 35-45 30-42 18-30	1.25-1.45 1.30-1.50 1.30-1.50 1.40-1.60 1.40-1.55	0.2-0.6 0.06-0.2 <0.06 <0.2 0.06-0.2	0.22-0.24 0.15-0.20 0.09-0.20 0.11-0.20 0.16-0.21	4.5-7.3 4.5-6.5 4.5-6.5 4.5-7.8 5.6-8.4	Low---------- Low---------- High--------- High--------- Moderate------	0.43 0.43 0.43 0.43 0.43	3	6	1-3
30F-------------- Hamburg	0-4 4-60	6-12 6-12	1.20-1.30 1.20-1.30	0.6-2.0 0.6-2.0	0.20-0.24 0.17-0.22	6.6-8.4 7.4-8.4	Low---------- Low----------	0.43 0.43	5	4L	.5-2
70--------------- Beaucoup	0-16 16-46 46-60	27-35 27-35 15-30	1.25-1.45 1.30-1.50 1.35-1.55	0.2-0.6 0.2-0.6 0.2-0.6	0.21-0.23 0.18-0.20 0.18-0.22	5.6-7.8 5.6-7.8 5.6-7.8	Moderate------ Moderate------ Moderate------	0.32 0.32 0.32	5	7	5-6
75B, 75C, 75D, 75F-------------- Drury	0-7 7-60	15-20 18-22	1.20-1.40 1.25-1.45	0.6-2.0 0.6-2.0	0.22-0.24 0.20-0.22	5.6-7.3 5.6-7.8	Low---------- Low----------	0.37 0.37	5	5	1-2
78--------------- Arenzville	0-27 27-44 44-60	10-18 10-30 10-20	1.20-1.55 1.25-1.45 1.20-1.40	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.24 0.18-0.22 0.20-0.22	5.6-7.8 5.6-7.8 5.6-7.8	Low---------- Moderate------ Low----------	0.37 0.37 0.37	5	5	1-3
84--------------- Okaw	0-17 17-60	15-27 40-60	1.20-1.40 1.35-1.60	0.2-0.6 <0.06	0.22-0.24 0.09-0.18	4.5-7.3 4.5-6.0	Low---------- High---------	0.43 0.32	3	6	1-3
96F-------------- Eden	0-3 3-24 24	12-27 40-60 ---	1.30-1.50 1.45-1.65 ---	0.06-0.6 0.06-0.2 ---	0.12-0.18 0.08-0.13 ---	4.5-8.4 5.1-8.4 ---	Moderate------ Moderate------ ----------	0.17 0.28 ----	3	6	.5-3
122B------------- Colp	0-8 8-12 12-48 48-60	20-27 18-25 35-50 30-45	1.25-1.45 1.30-1.55 1.45-1.70 1.50-1.70	0.2-0.6 0.2-0.6 0.06-0.2 0.06-0.2	0.22-0.24 0.20-0.22 0.10-0.17 0.10-0.18	5.1-7.8 5.1-7.8 4.5-5.0 4.5-8.4	Low---------- Low---------- High--------- High---------	0.43 0.43 0.32 0.32	3	6	1-2
122C3------------ Colp	0-9 9-35 35-60	27-35 18-25 35-50	1.40-1.65 1.30-1.55 1.45-1.70	0.2-0.6 0.2-0.6 0.06-0.2	0.18-0.20 0.20-0.22 0.10-0.17	5.1-7.8 5.1-7.8 4.5-5.0	Moderate------ Low---------- High---------	0.43 0.43 0.32	2	7	.5-1
123*. Riverwash											
180-------------- Dupo	0-16 16-34 34-60	10-18 10-18 35-45	1.25-1.45 1.30-1.50 1.35-1.60	0.6-2.0 0.6-2.0 0.06-0.2	0.22-0.24 0.20-0.22 0.08-0.19	5.6-8.4 5.6-8.4 6.6-7.8	Low---------- Low---------- High---------	0.37 0.37 0.37	5	5	1-2

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
226----------	0-13	10-18	1.30-1.45	0.6-2.0	0.17-0.20	5.6-7.8	Low----------	0.37	5	5	.5-3
Wirt	13-33	10-18	1.40-1.55	0.6-2.0	0.15-0.20	5.6-7.3	Low----------	0.24			
	33-60	8-18	1.45-1.60	2.0-6.0	0.07-0.17	5.6-7.3	Low----------	0.24			
249----------	0-19	25-35	1.10-1.30	0.6-2.0	0.21-0.24	5.6-7.8	High---------	0.37	4	6	3-4
Edinburg	19-49	35-46	1.20-1.40	0.06-0.2	0.13-0.20	5.6-7.3	High---------	0.37			
	49-60	22-30	1.30-1.50	0.2-2.0	0.18-0.22	6.6-7.8	Moderate-----	0.37			
274G----------	0-6	15-22	1.10-1.20	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	6	1-3
Seaton	6-60	18-27	1.15-1.30	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37			
284----------	0-15	22-35	1.25-1.45	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.32	5	7	2-3
Tice	15-60	22-35	1.30-1.50	0.6-2.0	0.18-0.21	5.6-7.8	Moderate-----	0.32			
302----------	0-11	27-35	1.40-1.60	0.6-2.0	0.17-0.23	5.6-7.3	Moderate-----	0.28	5	6	2-3
Ambraw	11-34	24-35	1.45-1.65	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.28			
	34-60	18-30	1.50-1.70	0.6-2.0	0.11-0.22	6.1-8.4	Low----------	0.28			
304B----------	0-39	7-20	1.40-1.60	2.0-6.0	0.13-0.20	6.1-8.4	Low----------	0.20	5	3	1-2
Landes	39-60	5-18	1.60-1.80	6.0-20	0.05-0.15	6.1-8.4	Low----------	0.20			
308B----------	0-10	12-26	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	5	.5-2
Alford	10-51	22-30	1.35-1.50	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.37			
	51-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37			
308C2, 308D3, 308E3, 308F-----	0-8	12-26	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	5	.5-2
Alford	8-60	22-30	1.35-1.50	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.37			
333----------	0-9	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Wakeland	9-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
334----------	0-36	15-25	1.20-1.40	0.2-0.6	0.22-0.24	5.6-7.8	Low----------	0.43	5	6	1-3
Birds	36-60	18-27	1.40-1.60	0.2-0.6	0.20-0.22	5.1-7.8	Low----------	0.43			
336----------	0-8	10-17	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Wilbur	8-60	10-17	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
338B----------	0-16	20-27	1.25-1.45	0.2-0.6	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	1-2
Hurst	16-60	35-48	1.45-1.70	<0.06	0.10-0.17	3.6-7.3	High---------	0.32			
394B----------	0-15	15-25	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	Low----------	0.37	5	4L	1-3
Haynie	15-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	Low----------	0.37			
408. Aquents											
430----------	0-19	18-24	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5-4	6	2-4
Raddle	19-60	18-24	1.20-1.40	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.43			
452A----------	0-11	24-27	1.20-1.40	0.6-2.0	0.18-0.24	5.6-7.8	Moderate-----	0.28	4	6	3-4
Riley	11-33	24-35	1.25-1.45	0.6-2.0	0.16-0.20	5.6-7.8	Moderate-----	0.28			
	33-60	2-10	1.65-1.80	6.0-20	0.05-0.10	6.6-8.4	Low----------	0.17			
453B----------	0-14	15-27	1.25-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	5	.5-2
Muren	14-43	22-30	1.35-1.50	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-----	0.37			
	43-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.6-6.5	Low----------	0.37			
453C2, 453D3-----	0-8	15-27	1.25-1.40	0.6-2.0	0.22-0.24	5.1-6.5	Low----------	0.37	5	5	.5-2
Muren	8-37	22-30	1.35-1.50	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-----	0.37			
	37-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.6-6.5	Low----------	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
457----------	0-13	40-70	1.30-1.50	<0.06	0.12-0.14	5.6-7.3	Very high----	0.28	5	4	1-3
Booker	13-60	60-75	1.30-1.50	<0.06	0.09-0.11	5.6-7.3	Very high----	0.28			
517A, 517B-------	0-12	9-18	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	3	5	1-2
Marine	12-42	35-48	1.45-1.70	0.06-0.2	0.11-0.18	4.5-6.5	High---------	0.37			
	42-60	15-35	1.45-1.65	0.2-0.6	0.18-0.22	5.1-6.5	Moderate-----	0.37			
591----------	0-12	40-60	1.20-1.40	<0.06	0.12-0.20	5.6-7.8	High---------	0.28	5	4	3-4
Fults	12-32	35-60	1.30-1.50	<0.06	0.11-0.18	5.6-7.8	High---------	0.28			
	32-42	10-35	1.40-1.70	0.6-2.0	0.12-0.16	5.6-7.8	Moderate-----	0.28			
	42-60	3-20	1.60-1.80	2.0-6.0	0.05-0.13	5.6-7.8	Low----------	0.17			
592----------	0-14	35-60	1.20-1.40	<0.06	0.12-0.21	6.1-7.3	High---------	0.28	5	4	2-4
Nameoki	14-30	35-60	1.30-1.50	<0.06	0.11-0.18	5.1-7.3	High---------	0.28			
	30-56	15-35	1.45-1.70	0.6-2.0	0.12-0.20	5.1-7.8	Low----------	0.28			
	56-60	5-30	1.50-1.80	0.6-2.0	0.05-0.20	5.6-7.8	Low----------	0.28			
605F----------	0-11	15-27	1.30-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.43	4	6	1-3
Ursa	11-60	35-45	1.50-1.70	0.06-0.2	0.09-0.17	4.5-7.3	High---------	0.32			
621B2----------	0-7	15-27	1.30-1.50	0.2-0.6	0.21-0.23	5.6-7.8	Low----------	0.43	3	6	.5-1
Coulterville	7-23	27-35	1.45-1.65	0.06-0.2	0.15-0.18	4.5-7.8	Moderate-----	0.43			
	23-56	18-35	1.45-1.65	0.06-0.2	0.10-0.15	7.4-8.4	Moderate-----	0.43			
	56-60	15-30	1.40-1.65	0.2-0.6	0.05-0.10	7.4-8.4	Low----------	0.43			
621C3----------	0-9	27-35	1.40-1.60	0.2-0.6	0.18-0.20	5.1-7.8	Moderate-----	0.43	3	7	.5-1
Coulterville	9-60	27-35	1.45-1.65	0.06-0.2	0.10-0.15	4.5-7.8	Moderate-----	0.43			
785G----------	0-18	18-33	1.25-1.40	0.6-2.0	0.15-0.22	7.4-8.4	Low----------	0.24	2	8	3-5
Lacrescent	18-60	8-20	1.30-1.50	2.0-6.0	0.05-0.08	7.4-8.4	Low----------	0.24			
787----------	0-14	10-18	1.30-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.43	3	5	.5-1
Banlic	14-33	12-27	1.40-1.60	0.06-0.2	0.20-0.22	4.5-7.3	Low----------	0.43			
	33-60	10-18	1.65-1.80	0.06-0.2	0.10-0.11	4.5-6.0	Low----------	0.43			
802D.											
Orthents											
807*:											
Aquents.											
Orthents.											
864*.											
Pits											
988F*:											
Westmore---------	0-10	15-27	1.35-1.50	0.6-2.0	0.17-0.21	5.1-7.3	Low----------	0.37	4	6	1-3
	10-22	25-35	1.40-1.60	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	22-60	35-60	1.40-1.75	0.06-0.2	0.12-0.16	5.1-7.3	High---------	0.37			
Neotoma----------	0-3	6-16	1.20-1.45	0.6-6.0	0.10-0.20	5.1-6.5	Low----------	0.20	3	8	3-6
	3-60	6-20	1.25-1.50	2.0-6.0	0.02-0.09	4.5-6.5	Low----------	0.20			
1302----------	0-12	18-35	1.40-1.60	0.6-2.0	0.15-0.23	5.6-7.3	Moderate-----	0.28	5	6	2-3
Ambraw	12-33	20-35	1.45-1.70	0.6-2.0	0.15-0.24	7.3-8.4	Moderate-----	0.28			
	33-60	10-30	1.50-1.70	0.6-2.0	0.10-0.20	7.3-8.4	Low----------	0.28			
1457----------	0-16	40-70	1.30-1.50	<0.06	0.12-0.14	5.6-7.3	Very high----	0.28	5	4	1-3
Booker	16-60	60-75	1.30-1.50	<0.06	0.09-0.11	5.6-7.3	Very high----	0.28			
3092B----------	0-9	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	Low----------	0.15	5	1	<1
Sarpy	9-60	2-5	1.20-1.50	6.0-20	0.05-0.09	7.4-8.4	Low----------	0.15			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
3302----------	0-6	18-35	1.40-1.60	0.6-2.0	0.15-0.23	5.6-7.3	Moderate-----	0.28	5	6	2-3
Ambraw	6-60	10-30	1.50-1.70	0.6-2.0	0.10-0.20	7.3-8.4	Low----------	0.28			
3333----------	0-12	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Wakeland	12-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
3394B----------	0-10	15-25	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	Low----------	0.37	5	4L	1-3
Haynie	10-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	Low----------	0.37			
5308C, 5308E, 5308G----------	0-6	12-26	1.25-1.40	0.6-2.0	0.22-0.24	3.6-7.3	Low----------	0.37	5	5	.5-2
Alford	6-55	22-30	1.35-1.50	0.6-2.0	0.18-0.20	3.6-6.0	Moderate-----	0.37			
	55-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37			
5453B, 5453C-----	0-9	15-27	1.25-1.40	0.6-2.0	0.22-0.24	5.1-6.5	Low----------	0.37	5	5	.5-2
Muren	9-52	22-30	1.35-1.50	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-----	0.37			
	52-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.6-6.5	Low----------	0.37			
6621----------	0-9	12-27	1.35-1.50	0.2-0.6	0.22-0.24	6.1-7.3	Low----------	0.43	2	6	1-3
Coulterville Variant	9-12	11-25	1.40-1.55	0.06-0.2	0.20-0.22	6.1-7.8	Low----------	0.43			
	12-39	25-35	1.45-1.65	<0.06	0.11-0.14	5.6-8.4	Moderate-----	0.43			
	39-60	18-35	1.55-1.75	0.06-0.2	0.10-0.15	6.6-8.4	Moderate-----	0.43			
7038B----------	0-10	10-18	1.55-1.75	2.0-6.0	0.20-0.24	6.6-8.4	Low----------	0.32	5	4L	.5-1
Rocher	10-60	5-18	1.65-1.85	2.0-6.0	0.12-0.17	7.4-8.4	Low----------	0.24			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
5C3, 5D3---------- Blair	C	None--------	---	---	1.5-3.5	Apparent	Mar-Jun	>60	---	High-----	High-----	High.
7D3, 7E3---------- Atlas	D	None--------	---	---	0-2.0	Perched	Apr-Jun	>60	---	High-----	High-----	Moderate.
8F---------- Hickory	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
16---------- Rushville	D	None--------	---	---	+1-1.0	Perched	Mar-Jun	>60	---	High-----	High-----	High.
30F---------- Hamburg	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Low.
70---------- Beaucoup	B/D	Rare--------	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
75B, 75C, 75D, 75F---------- Drury	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
78---------- Arenzville	B	Rare--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
84---------- Okaw	D	Occasional	Brief-----	Mar-Jun	+.5-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	High.
96F---------- Eden	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low.
122B, 122C3------- Colp	C	None--------	---	---	2.0-4.0	Apparent	Mar-Jun	>60	---	High-----	High-----	High.
123*. Riverwash												
180---------- Dupo	C	Rare--------	---	---	1.5-3.5	Apparent	Jan-Jun	>60	---	High-----	High-----	Moderate.
226---------- Wirt	B	Occasional	Brief-----	Nov-Jun	>6.0	---	---	>60	---	Moderate	Low------	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
249---------- Edinburg	C	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
274G---------- Seaton	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
284---------- Tice	B	Rare--------	---	---	1.5-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
302---------- Ambraw	B/D	Rare--------	---	---	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
304B---------- Landes	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Low.
308B, 308C2, 308D3, 308E3, 308F---------- Alford	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
333---------- Wakeland	C	Occasional	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	Low.
334---------- Birds	C/D	Frequent----	Long------	Mar-Jun	+.5-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
336---------- Wilbur	B	Rare--------	---	---	1.5-3.0	Apparent	Mar-Apr	>60	---	High-----	Moderate	Moderate.
338B---------- Hurst	D	Rare--------	---	---	1.0-3.0	Apparent	Feb-Apr	>60	---	Moderate	High-----	High.
394B---------- Haynie	B	Rare--------	---	---	3.0-6.0	Apparent	Feb-Jul	>60	---	High-----	Low------	Low.
408. Aquents												
430---------- Raddle	B	Rare--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
452A---------- Riley	B	Rare--------	---	---	1.5-3.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Low.
453B, 453C2, 453D3---------- Muren	B	None--------	---	---	2.0-6.0	Apparent	Mar-Apr	>60	---	High-----	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
457---------- Booker	D	Occasional	Brief-----	Apr-Jul	+.5-1.0	Perched	Nov-May	>60	---	Moderate	High-----	Moderate.
517A, 517B-------- Marine	C	None--------	---	---	1.0-2.0	Perched	Jan-May	>60	---	High-----	High-----	High.
591---------- Fults	D	Occasional	Brief-----	Mar-May	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
592---------- Nameoki	D	Rare--------	---	---	1.0-3.0	Apparent	Jan-Jun	>60	---	High-----	High-----	Moderate.
605F---------- Ursa	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
621B2, 621C3------ Coulterville	D	None--------	---	---	1.0-3.0	Perched	Feb-Jun	>60	---	High-----	High-----	High.
785G---------- Lacrescent	B	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	Low.
787---------- Banlic	C	Rare--------	---	---	1.0-3.0	Perched	Jan-Jun	>60	---	High-----	High-----	High.
802D. Orthents												
807*: Aquents.												
Orthents.												
864*. Pits												
988F*: Westmore---------	C	None--------	---	---	>6.0	---	---	>60	---	High-----	High-----	Moderate.
Neotoma----------	B	None--------	---	---	>6.0	---	---	40-80	Hard	Low------	Low------	Moderate.
1302---------- Ambraw	B/D	Rare--------	---	---	+3-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
1457---------- Booker	D	Frequent----	Long------	Apr-Jul	+.5-1.0	Perched	Nov-May	>60	---	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
3092B---------- Sarpy	A	Frequent----	Long------	Nov-Jun	>6.0	---	---	>60	---	Low------	Low------	Low.
3302---------- Ambraw	B/D	Frequent----	Long------	Mar-Jun	+3-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
3333---------- Wakeland	C	Frequent----	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	Low.
3394B---------- Haynie	B	Frequent----	Very brief	Feb-Nov	3.0-6.0	Apparent	Feb-Jul	>60	---	High-----	Low------	Low.
5308C, 5308E, 5308G---------- Alford	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
5453B, 5453C------ Muren	B	None--------	---	---	2.0-6.0	Apparent	Mar-Apr	>60	---	High-----	High-----	Moderate.
6621---------- Coulterville Variant	D	None--------	---	---	+.5-2.0	Perched	Mar-Jun	>60	---	High-----	High-----	Low.
7038B---------- Rocher	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alford	Fine-silty, mixed, mesic Typic Hapludalfs
Ambraw	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
Aquents	Loamy, mixed, mesic Fluvaquents
Arenzville	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Atlas	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
*Banlic	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Beaucoup	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls
Birds	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Blair	Fine-silty, mixed, mesic Aquic Hapludalfs
Booker	Very fine, montmorillonitic, mesic Vertic Haplaquolls
Colp	Fine, montmorillonitic, mesic Aquic Hapludalfs
Coulterville	Fine-silty, mixed, mesic Aeric Ochraqualfs
Coulterville Variant	Fine-silty, mixed, mesic Typic Ochraqualfs
Drury	Fine-silty, mixed, mesic Dystric Eutrochrepts
Dupo	Coarse-silty over clayey, mixed, nonacid, mesic Aquic Udifluvents
*Eden	Fine, mixed, mesic Typic Hapludalfs
Edinburg	Fine, montmorillonitic, mesic Typic Argiaquolls
Fults	Clayey over loamy, montmorillonitic, mesic Vertic Haplaquolls
Hamburg	Coarse-silty, mixed (calcareous), mesic Typic Udorthents
Haynie	Coarse-silty, mixed (calcareous), mesic Mollic Udifluvents
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Hurst	Fine, montmorillonitic, mesic Aeric Ochraqualfs
*Lacrescent	Loamy-skeletal, mixed, mesic Typic Hapludolls
Landes	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Marine	Fine, montmorillonitic, mesic Aeric Albaqualfs
Muren	Fine-silty, mixed, mesic Aquic Hapludalfs
Nameoki	Fine, montmorillonitic, mesic Vertic Hapludolls
Neotoma	Loamy-skeletal, mixed, mesic Ultic Hapludalfs
Okaw	Fine, montmorillonitic, mesic Typic Albaqualfs
Orthents	Loamy, mixed, mesic Udorthents
Raddle	Fine-silty, mixed, mesic Typic Hapludolls
*Riley	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Hapludolls
*Rocher	Coarse-loamy, mixed (calcareous), mesic Typic Udifluvents
Rushville	Fine, montmorillonitic, mesic Typic Albaqualfs
Sarpy	Mixed, mesic Typic Udipsamments
Seaton	Fine-silty, mixed, mesic Typic Hapludalfs
Tice	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Ursa	Fine, montmorillonitic, mesic Typic Hapludalfs
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents
Westmore	Fine-silty, mixed, mesic Typic Hapludalfs
Wilbur	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents
Wirt	Coarse-loamy, mixed, nonacid, mesic Typic Udifluvents

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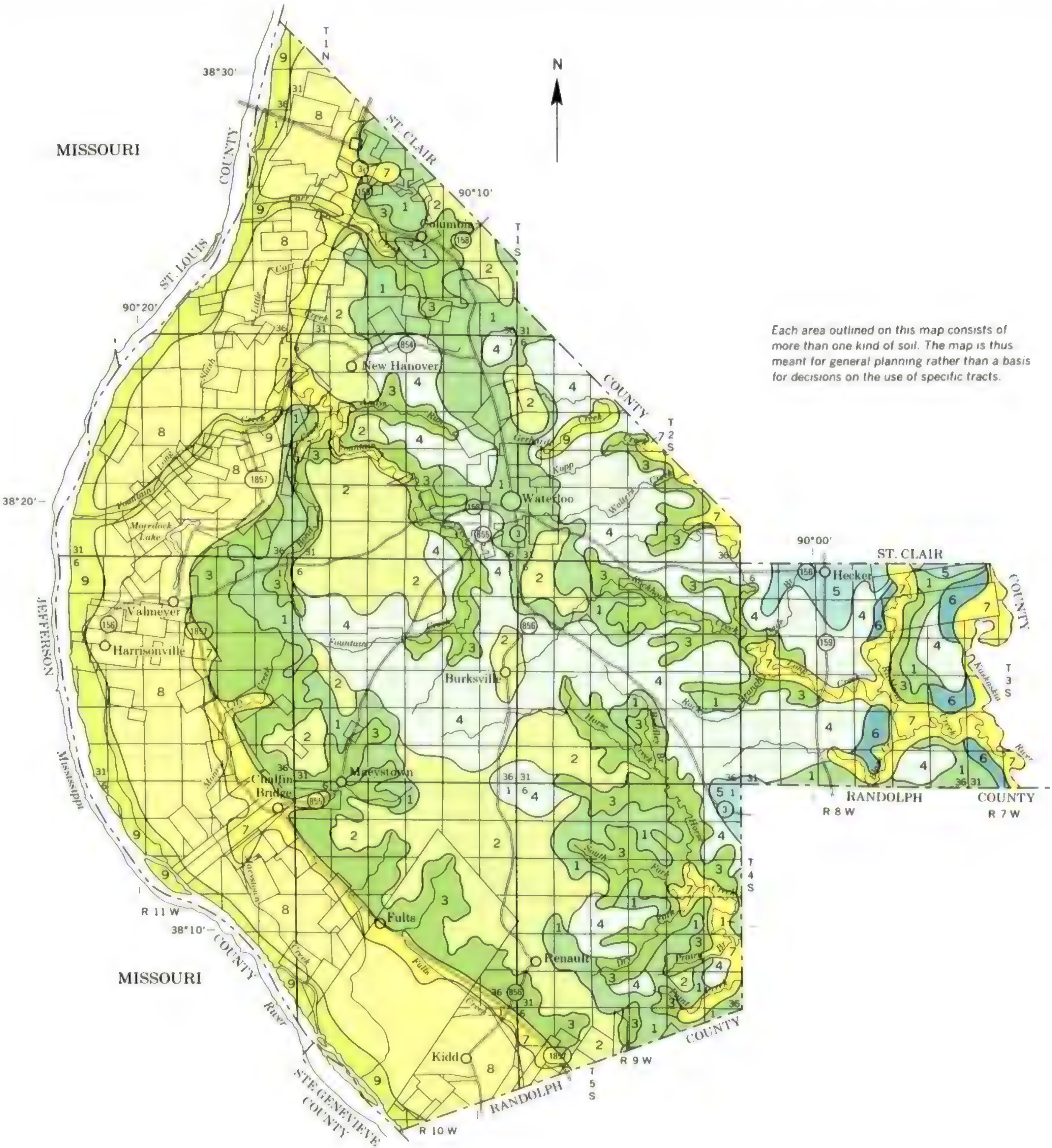


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND*

GENTLY SLOPING TO VERY STEEP, MODERATELY PERMEABLE AND SLOWLY PERMEABLE SOILS THAT FORMED IN LOESS, GLACIAL TILL, OR RESIDUUM, ON UPLANDS

1 — Muren-Alford association: Gently sloping to moderately steep, well drained and moderately well drained, moderately permeable, silty soils, formed in loess

2 — Alford association: Gently sloping to very steep, well drained, moderately permeable, silty soils, formed in loess in areas of karst topography

3 — Seaton-Hickory-Eden association: Steep and very steep, well drained, moderately permeable and slowly permeable, silty and loamy soils, formed in loess, glacial till, and residuum

NEARLY LEVEL TO STRONGLY SLOPING, MODERATELY SLOWLY PERMEABLE TO VERY SLOWLY PERMEABLE SOILS THAT FORMED IN LOESS OR SILTY SEDIMENTS, ON UPLANDS

4 — Blair-Marine association: Nearly level to strongly sloping, somewhat poorly drained, moderately slowly permeable and slowly permeable, silty soils, formed in silty sediments or in loess

5 — Coulterville-Coulterville Variant association: Nearly level to sloping, somewhat poorly drained and poorly drained, slowly permeable and very slowly permeable, silty soils, formed in loess

NEARLY LEVEL TO SLOPING, SLOWLY PERMEABLE AND VERY SLOWLY PERMEABLE SOILS THAT FORMED IN LOESS AND LACUSTRINE SEDIMENTS, ON TERRACES

6 — Colp-Hurst-Okaw association: Moderately well drained, somewhat poorly drained, and poorly drained, silty soils, formed in loess and lacustrine sediments

NEARLY LEVEL AND GENTLY SLOPING, VERY SLOWLY PERMEABLE TO RAPIDLY PERMEABLE SOILS THAT FORMED IN CLAYEY, LOAMY, OR SILTY ALLUVIUM, ON FLOOD PLAINS

7 — Wakeland-Wilbur-Birds association: Nearly level, somewhat poorly drained, moderately well drained, and poorly drained, moderately permeable and moderately slowly permeable, silty soils, formed in silty alluvium

8 — Fults-Ambraw-Riley association: Nearly level and gently sloping, poorly drained and somewhat poorly drained, very slowly permeable and moderately permeable, clayey, silty, and loamy soils, formed in clayey and loamy alluvium

9 — Ambraw-Haynie association: Nearly level and gently sloping, poorly drained and moderately well drained, moderately permeable, silty soils, formed in loamy alluvium

*The texture given in the descriptive heading of each association refers to the texture of the surface layer of the major soils in that association.

COMPILED 1986

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ILLINOIS AGRICULTURAL EXPERIMENT STATION

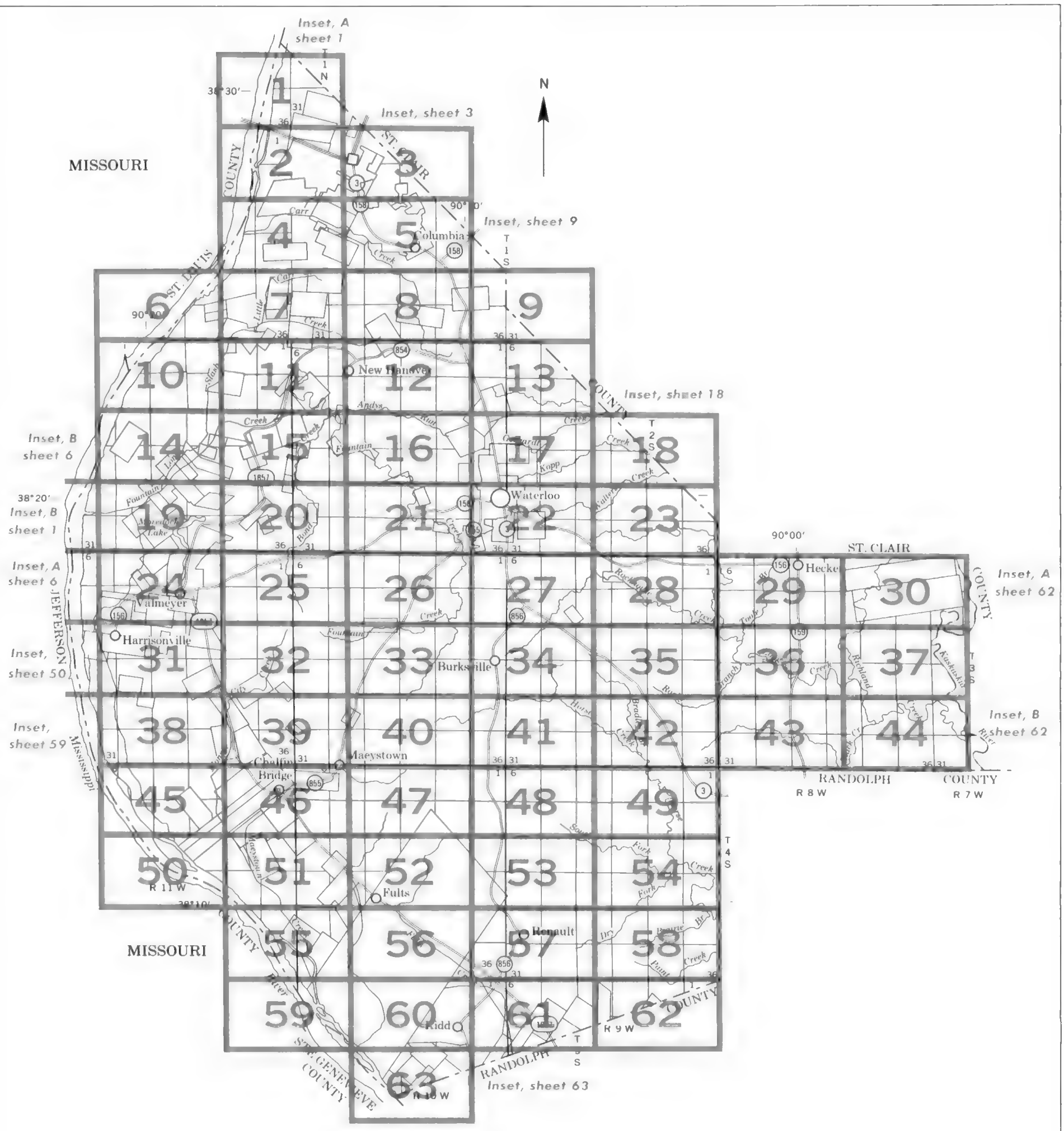
GENERAL SOIL MAP

MONROE COUNTY ILLINOIS

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

MONROE COUNTY ILLINOIS

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of numbers or combination of numbers and letters. The initial numbers represent the kinds of soil. A capital letter following these numbers indicate the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates the soil is moderately eroded and 3 that it is severely eroded

SYMBOL	NAME
5C3	Blair silty clay loam, 5 to 10 percent slopes, severely eroded
5D3	Blair silty clay loam, 10 to 15 percent slopes, severely eroded
7D3	Atlas silty clay loam, 10 to 15 percent slopes, severely eroded
7E3	Atlas silty clay loam, 15 to 20 percent slopes, severely eroded
8F	Hickory silt loam, 20 to 35 percent slopes
16	Rushville silt loam
30F	Hamburg silt loam, 20 to 30 percent slopes
70	Beaucoup silty clay loam
75B	Drury silt loam, 2 to 5 percent slopes
75C	Drury silt loam, 5 to 10 percent slopes
75D	Drury silt loam, 10 to 18 percent slopes
75F	Drury silt loam, 18 to 30 percent slopes
78	Arenzville silt loam
84	Okaw silt loam
96F	Eden flaggy silt loam, 20 to 30 percent slopes
122B	Colp silt loam, 1 to 5 percent slopes
122C3	Colp silty clay loam, 5 to 12 percent slopes, severely eroded
123	Riverwash
180	Dupo silt loam
226	Wirt silt loam
249	Edinburg silt loam
274G	Seaton silt loam, 30 to 60 percent slopes
284	Tice silty clay loam
302	Ambraw silty clay loam
304B	Landes very fine sandy loam, 1 to 7 percent slopes
308B	Alford silt loam, 2 to 5 percent slopes
308C2	Alford silt loam, 5 to 10 percent slopes, eroded
308D3	Alford silt loam, 10 to 15 percent slopes, severely eroded
308E3	Alford silt loam, 15 to 30 percent slopes, severely eroded
308F	Alford silt loam, 20 to 35 percent slopes
333	Wakeland silt loam
334	Birds silt loam
336	Wilbur silt loam
338B	Hurst silt loam, 1 to 7 percent slopes
394B	Hayrne silt loam, 1 to 5 percent slopes
408	Aquents, loamy
430	Raddle silt loam
452A	Riley loam, 0 to 3 percent slopes
453B	Muren silt loam, 2 to 5 percent slopes
453C2	Muren silt loam, 5 to 10 percent slopes, eroded
453D3	Muren silt loam, 10 to 15 percent slopes, severely eroded
457	Booker clay
517A	Marine silt loam, 0 to 2 percent slopes
517B	Marine silt loam, 2 to 5 percent slopes
591	Fults silty clay
592	Nameoki silty clay
605F	Ursa silt loam, 20 to 35 percent slopes
621B2	Coulterville silt loam, 2 to 5 percent slopes, eroded
621C3	Coulterville silty clay loam, 5 to 10 percent slopes, severely eroded
785G	Lacrescent flaggy silt loam, 30 to 70 percent slopes
787	Banlic silt loam
802D	Orthents, loamy, rolling
807	Aquents-Orthents complex
864	Pits, quarries
988F	Westmore-Neotoma complex, 20 to 35 percent slopes
1302	Ambraw silty clay loam, wet
1457	Booker clay, wet
3092B	Sarpy fine sand, frequently flooded, 1 to 7 percent slopes
3302	Ambraw silty clay loam, frequently flooded
3333	Wakeland silt loam, frequently flooded
3394B	Hayrne silt loam, frequently flooded, 1 to 5 percent slopes
5308C	Alford silt loam, karst, 5 to 12 percent slopes
5308E	Alford silt loam, karst, 12 to 25 percent slopes
5308G	Alford silt loam, karst, 25 to 55 percent slopes
5453B	Muren silt loam, karst, 2 to 5 percent slopes
5453C	Muren silt loam, karst, 5 to 12 percent slopes
6621	Coulterville Variant silt loam
7038B	Rocher loam, rarely flooded, 1 to 7 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

National, state or province

County or parish

Field sheet matchline & neatline

AD HOC BOUNDARY (label)

Small airport, airfield, park, oilfield, cemetery. (Davis Airstrip)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

Other roads

ROAD EMBLEMS & DESIGNATIONS

Interstate (70)

Federal (410)

State (52)

RAILROAD

LEVEES

Without road

DAMS

Large (to scale)

Medium or small (water)

PITS

Mine or quarry

WATER FEATURES

DRAINAGE

Perennial, double line

Perennial, single line

Intermittent

Drainage end

Canals or ditches

Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

Perennial

MISCELLANEOUS WATER FEATURES

Marsh or swamp

Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (308B 453C2)

ESCARPMENTS

Bedrock (points down slope)

Other than bedrock (points down slope)

SHORT STEEP SLOPE

DEPRESSION OR SINK

SOIL SAMPLE SITE

MISCELLANEOUS

Gumbo, slick or scabby spot (sodic)

Rock outcrop (includes sandstone and shale)

Sandy spot

Severely eroded spot

Stony spot, very stony spot

Disturbed soils

Till spot

INSET B

(Joins inset B, sheet 6)

INSET A

(Joins inset A, sheet 1)

(Joins sheet 19)

(Joins sheet 1)

(Joins inset A, sheet 6)

(Joins sheet 2)

(Joins inset, sheet 3)

2000 AND 5000-FOOT GRID TICKS

2000-FOOT GRID TICKS

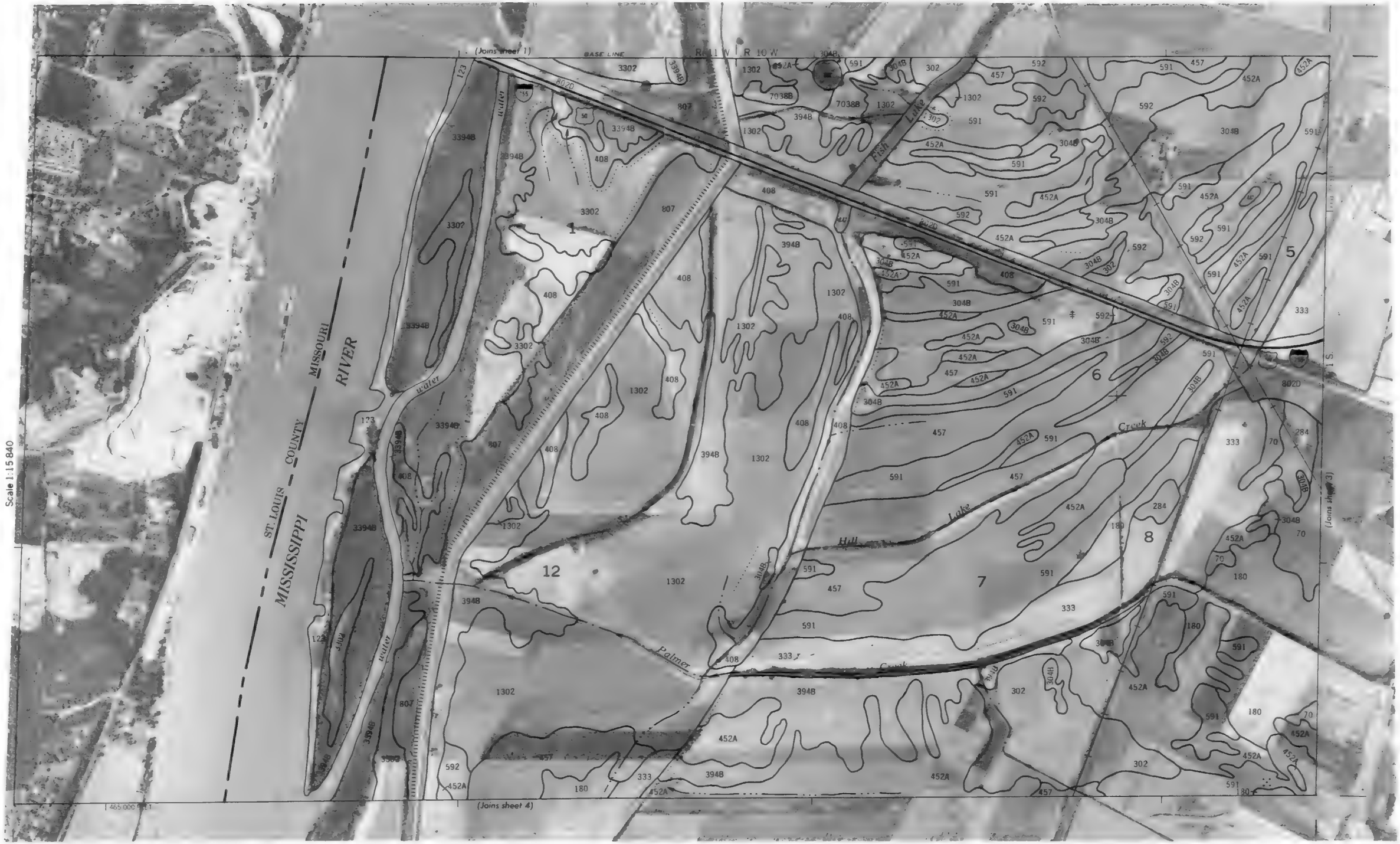
N

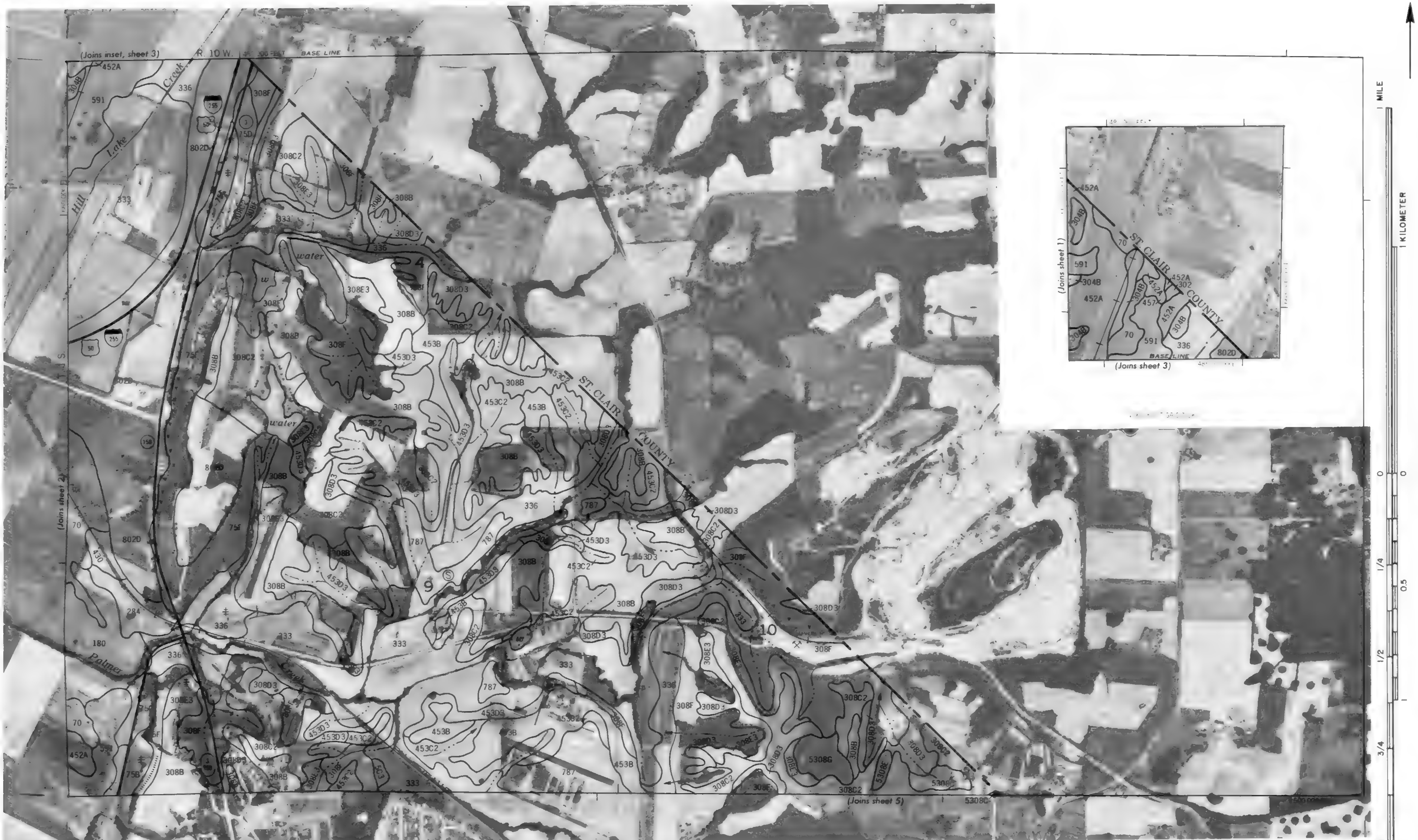
1 MILE

1 KILOMETER

Scale 1:15 840

This soil survey map is compiled on 1979 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned


(Joins sheet 1)
BASE LINE
R 11 W
R 10 W
MISSOURI RIVER
ST LOUIS COUNTY
MISSISSIPPI
Fish Lake
Hull Lake
Palmer Creek
Creek
water
(Joins sheet 3)
(Joins sheet 4)
465 000 FEET
1 MILE
1 KILOMETER
Scale 1:15 840


(Joins inset, sheet 3)
R. 10 W.
BASE LINE
Hill
Lake
Creek
Palmer
Creek
water
ST. CLAIR COUNTY
(Joins sheet 2)
(Joins sheet 5)
(Joins sheet 1)
(Joins sheet 3)
N
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

4

N

1 MILE

1 KILOMETER

Scale 1:15 840

(Joins sheet 2)

R. 11 W. | R. 10 W.

MISSISSIPPI RIVER

ST. LOUIS COUNTY

Carr Creek

water

(Joins sheet 7)

5

N

1 MILE
1 KILOMETER
Scale 1 15 840

6

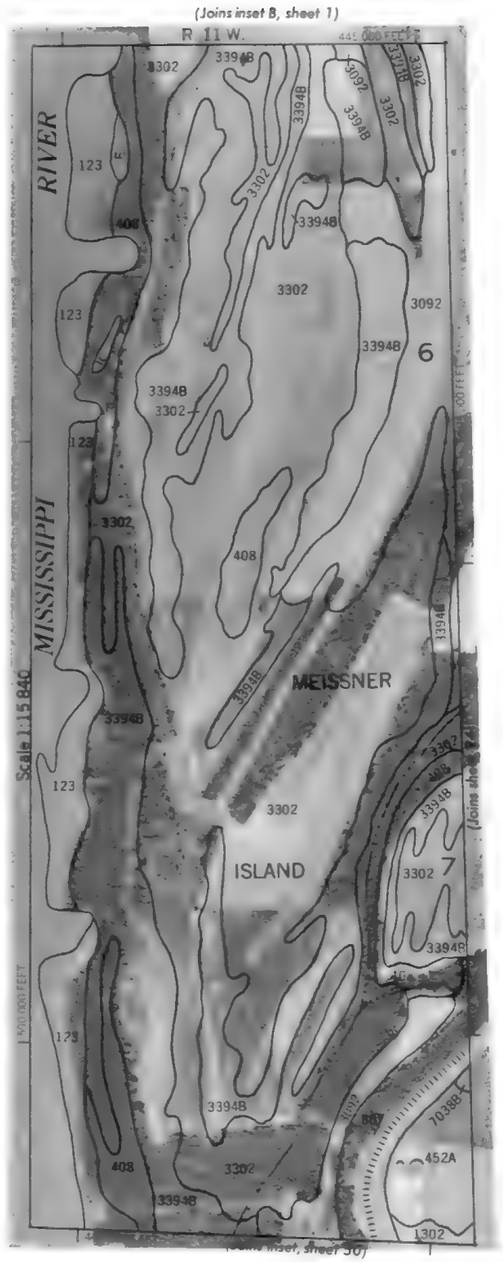
N

1 MILE

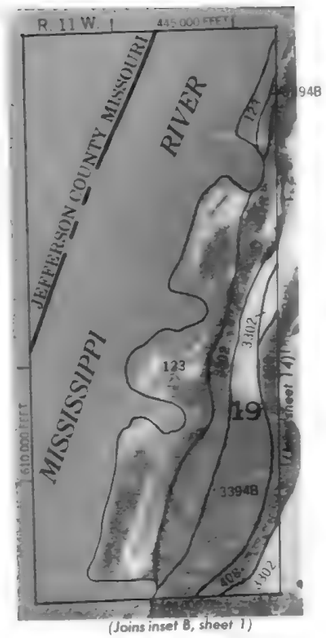
1 KILOMETER

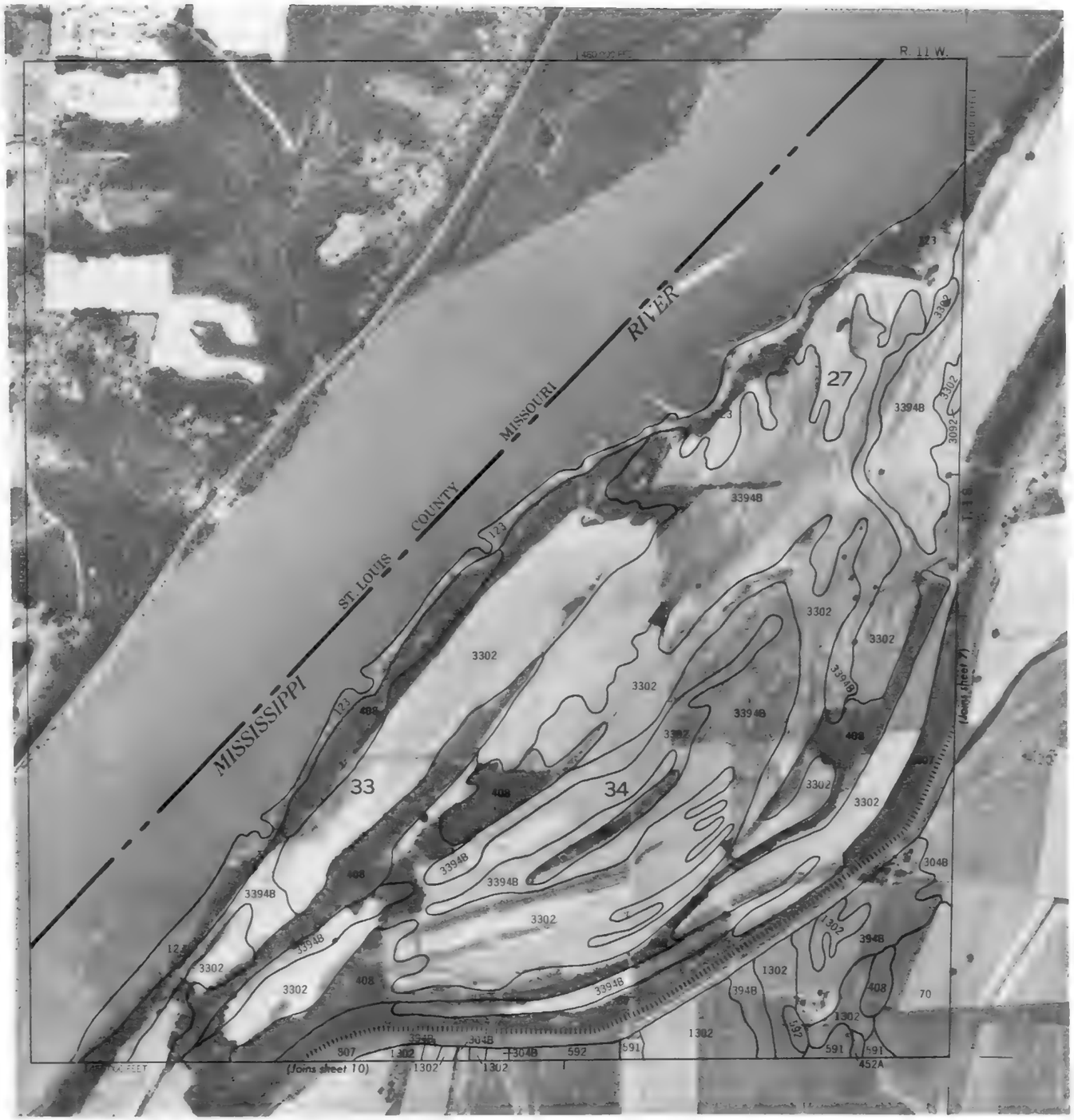
0 0 1/4 0.5 1/2 1 3/4 1

INSET A



INSET B





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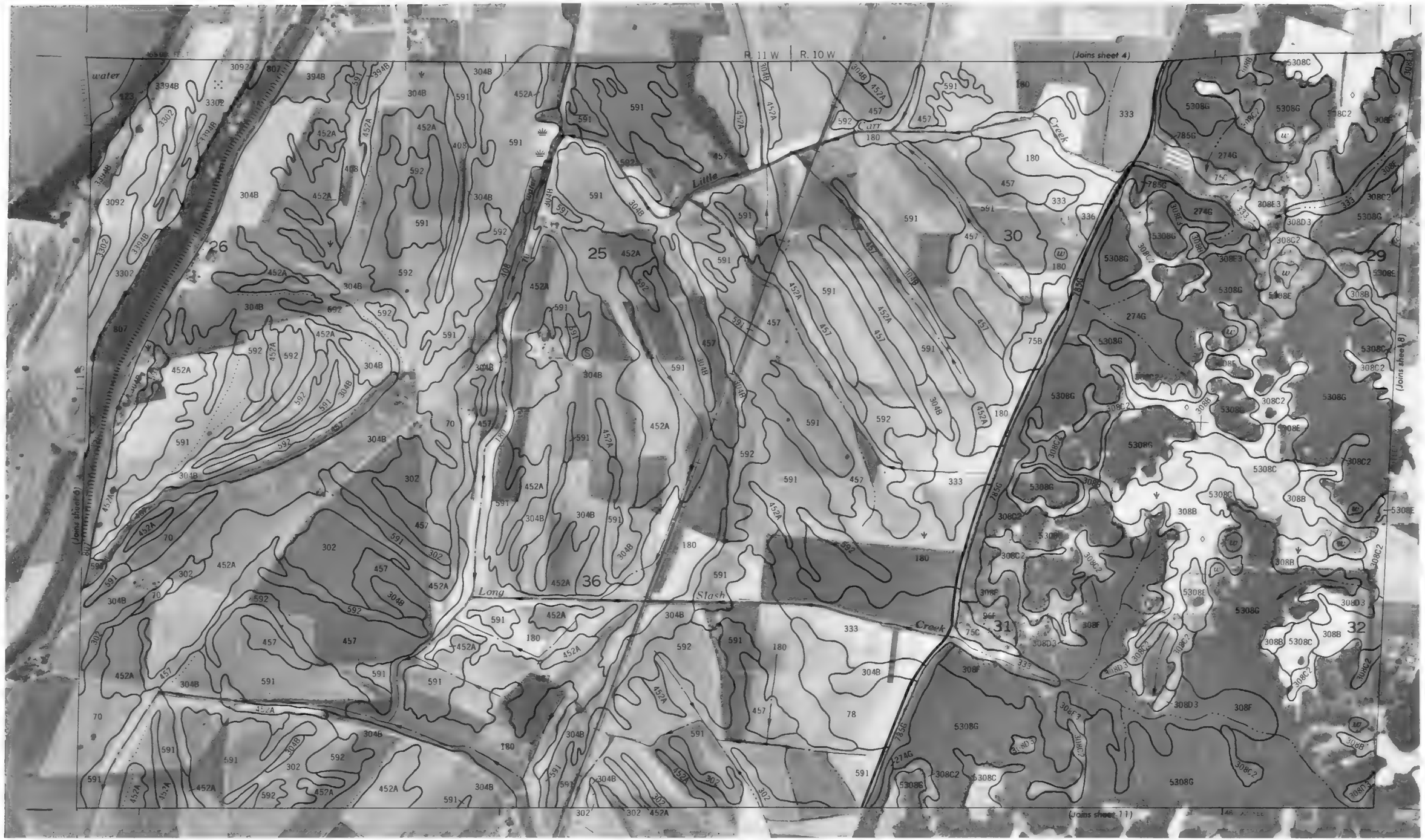
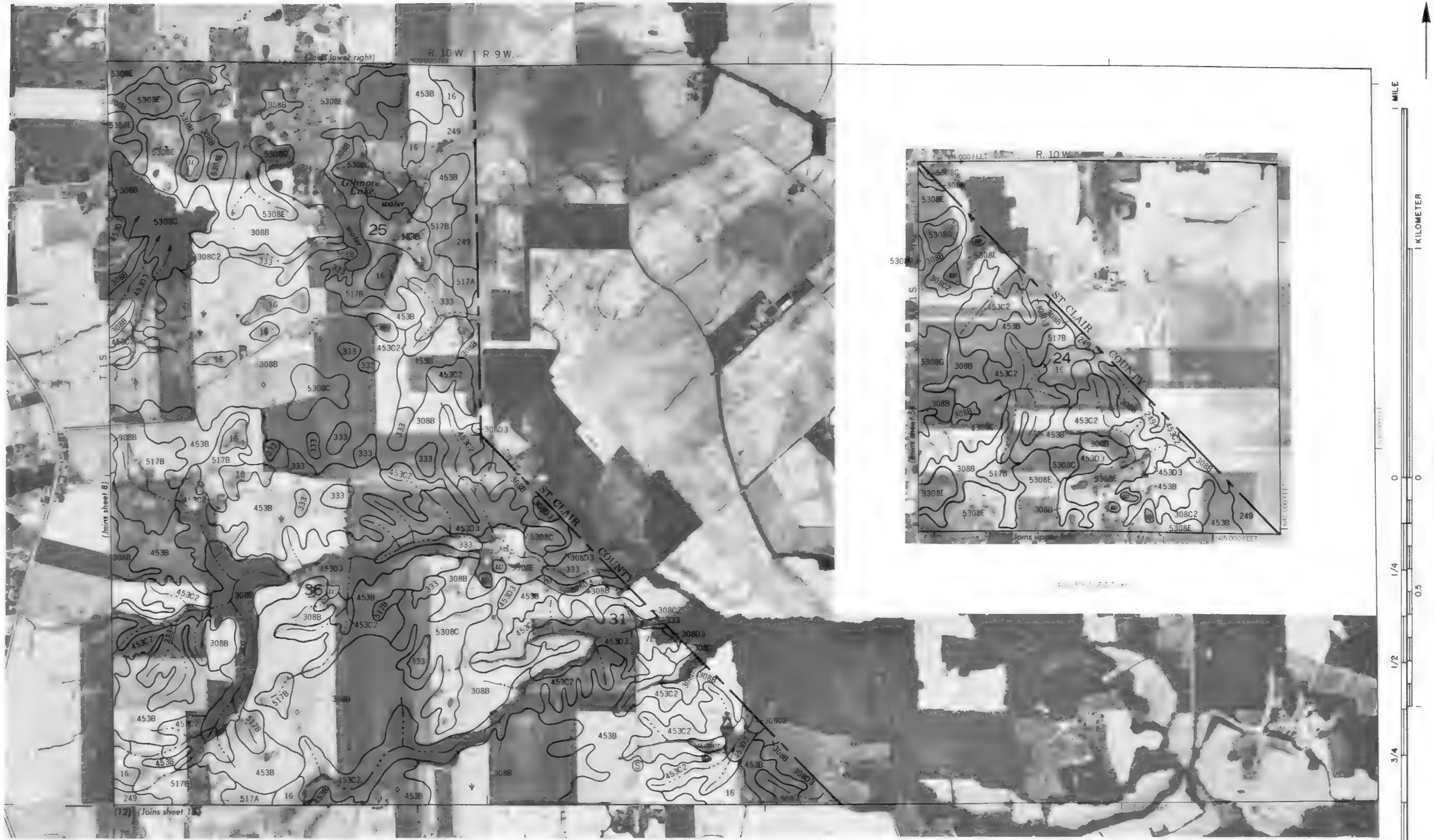

R. 11 W
R. 10 W
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 11)
water
Little Creek
Long Stash Creek
26
25
30
29
36
31
32
N
1 MILE
1 KILOMETER
Scale 1 15 840
0
1/4
1/2
3/4
0.5
1


8
N
1 MILE
1 KILOMETER
Scale 1 15 840
0
0.5
1
R. 10 W.
Wilson
water
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 10)
26
27
28
29
32
33
34
35
308C2
308B
308F
453D3
453C2
453B
5308G
5308E
5308C
308D3
308E3
517B
333
787
16
249


(Joins lower right)
R. 10 W.
R. 9 W.
T. 5 S.
Gilmore Lake
water
25
36
31
24
ST. CLAIR COUNTY
(Joins sheet 8)
(Joins sheet 12)
(Joins sheet 10)
(Joins upper)
5308E
5308G
5308C
308B
308C2
308D3
453B
453C2
453D3
517B
517A
249
333
16
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 6)
R. 11 W.
T. 2 S.
(Joins sheet 11)
(Joins sheet 14)
MISSISSIPPI
RIVER
MISSOURI
ST. LOUIS
COUNTY
JEFFERSON
COUNTY
Long
Creek


R. 11 W. | R. 10 W.
(Joins sheet 7)
(Joins sheet 10)
T. 2 S.
Long Wash Creek
Warnock
Luhrwood
Lakes
New
Hanover
Andys
Run
N
1 MILE
1 KILOMETER
Scale 1:15 840

12

N

1 MILE

1 KILOMETER

Scale 1 15 840

0 0 1/4 0.5 1/2 1 3/4 1

R 10 W

(Joins sheet 8) (9)

(Joins sheet 11)

(Joins sheet 13)

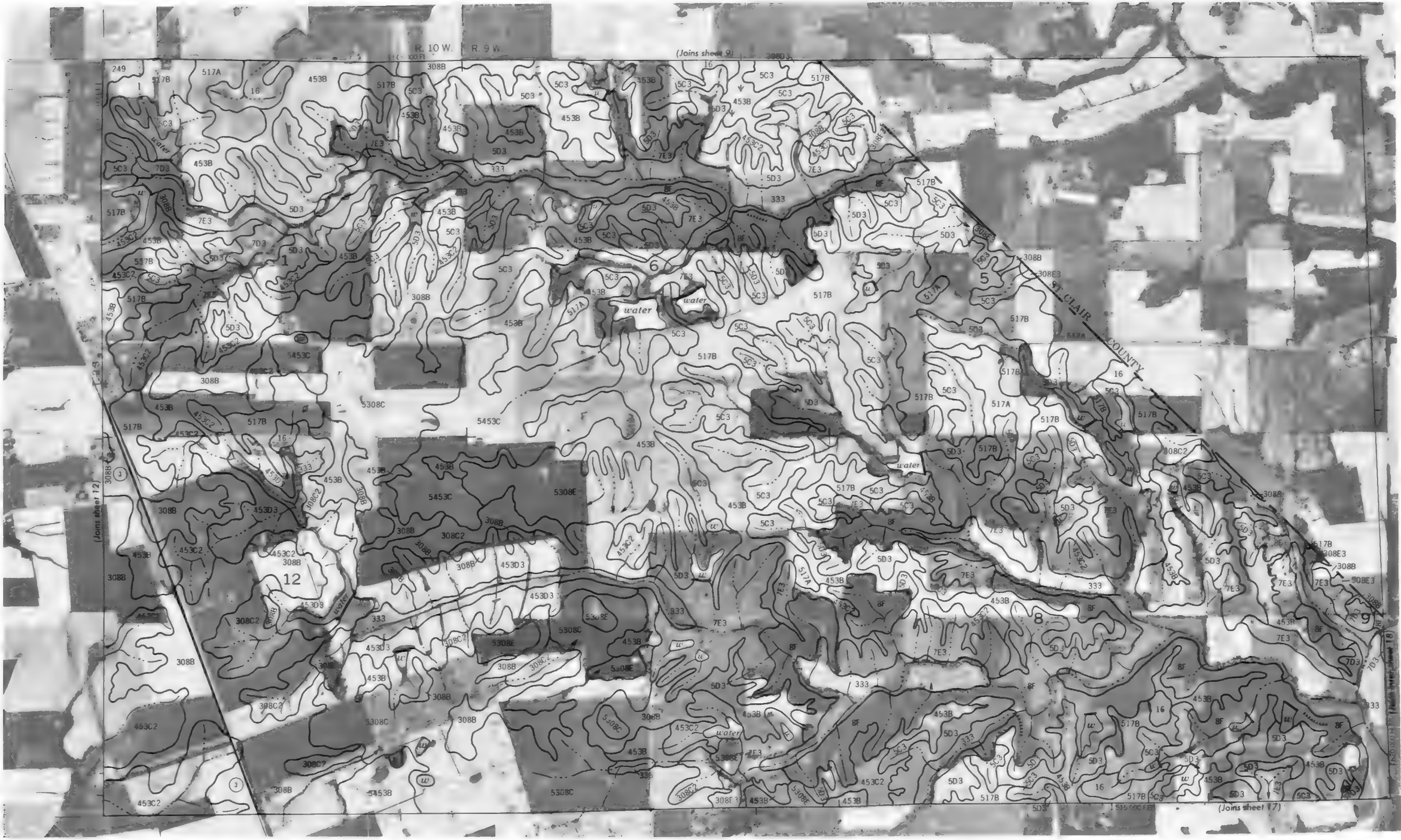
(Joins sheet 16)

New Hanover Station

water

Andys Run

This soil survey map was compiled in 1978 using aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies.



13

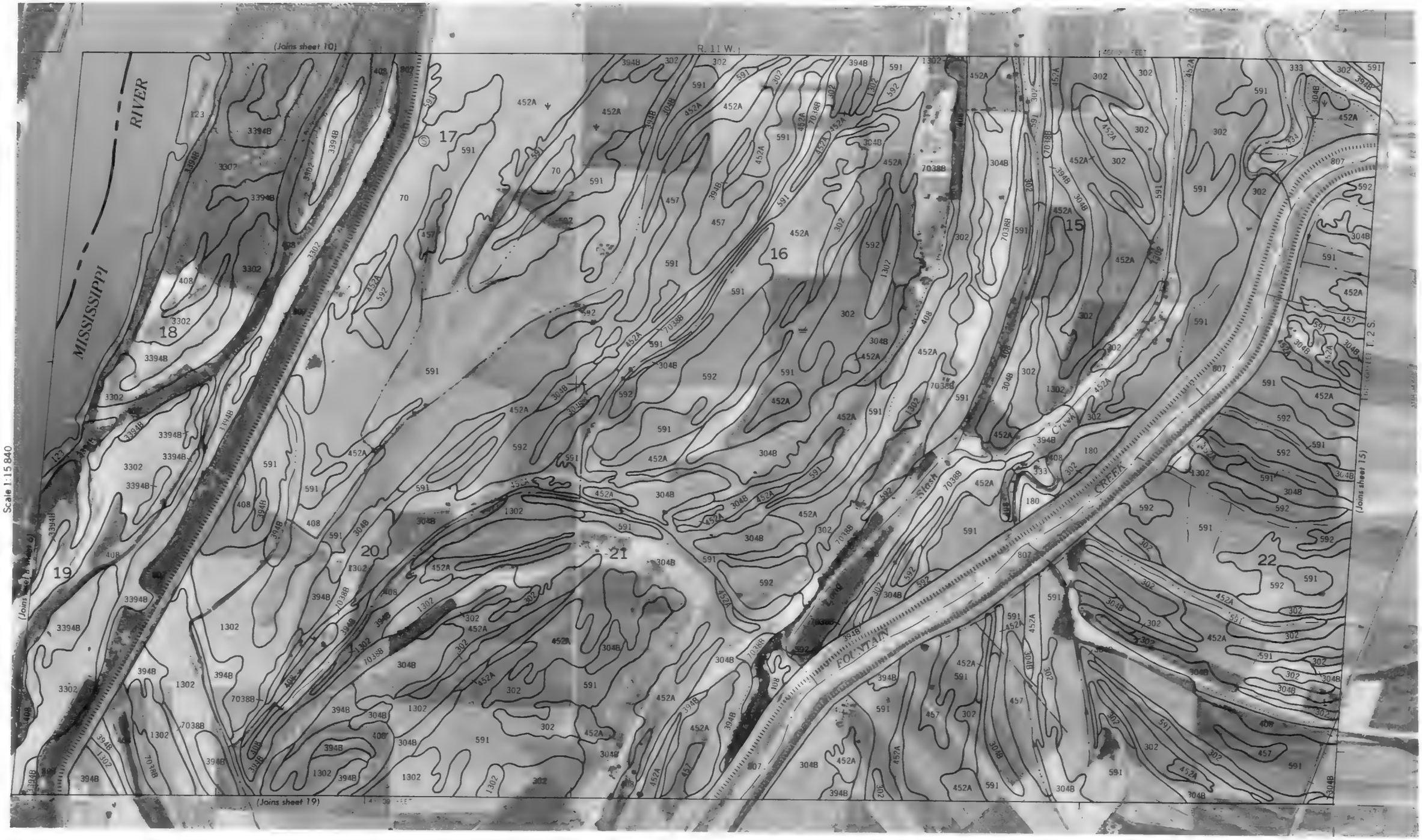
N

1 MILE

1 KILOMETER

Scale 1:15 840

0 0 1/4 0.5 1/2 1 3/4


(14)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
1
3/4
(Joins sheet 10)
R. 11 W.
T. 2 S.
MISSISSIPPI RIVER
(Joins sheet 15)
(Joins sheet 19)
(Joins sheet 9)
17
16
15
18
19
20
21
22
Creek
CREEK
FOUNTAIN
Marsh
Pond

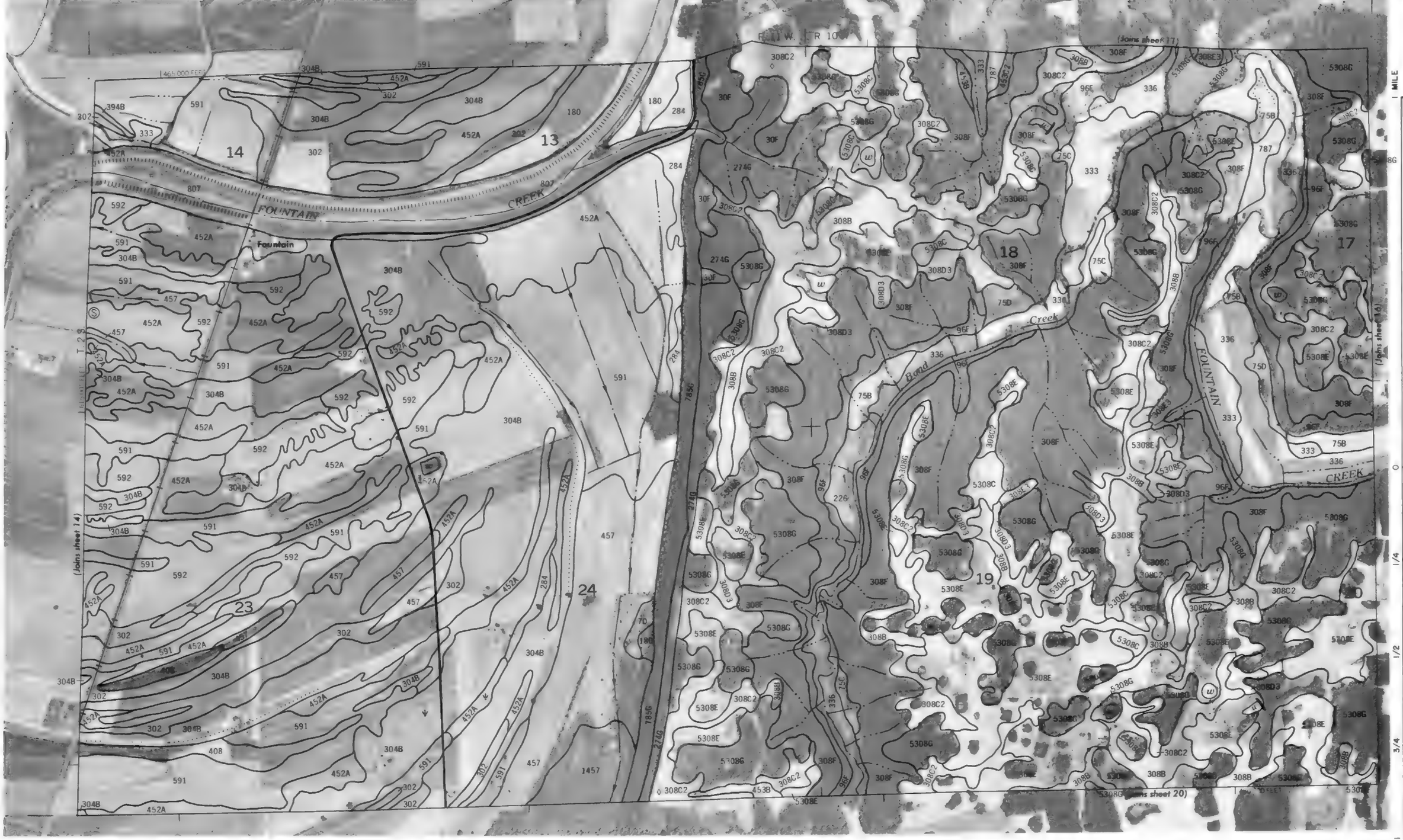
N

1 MILE

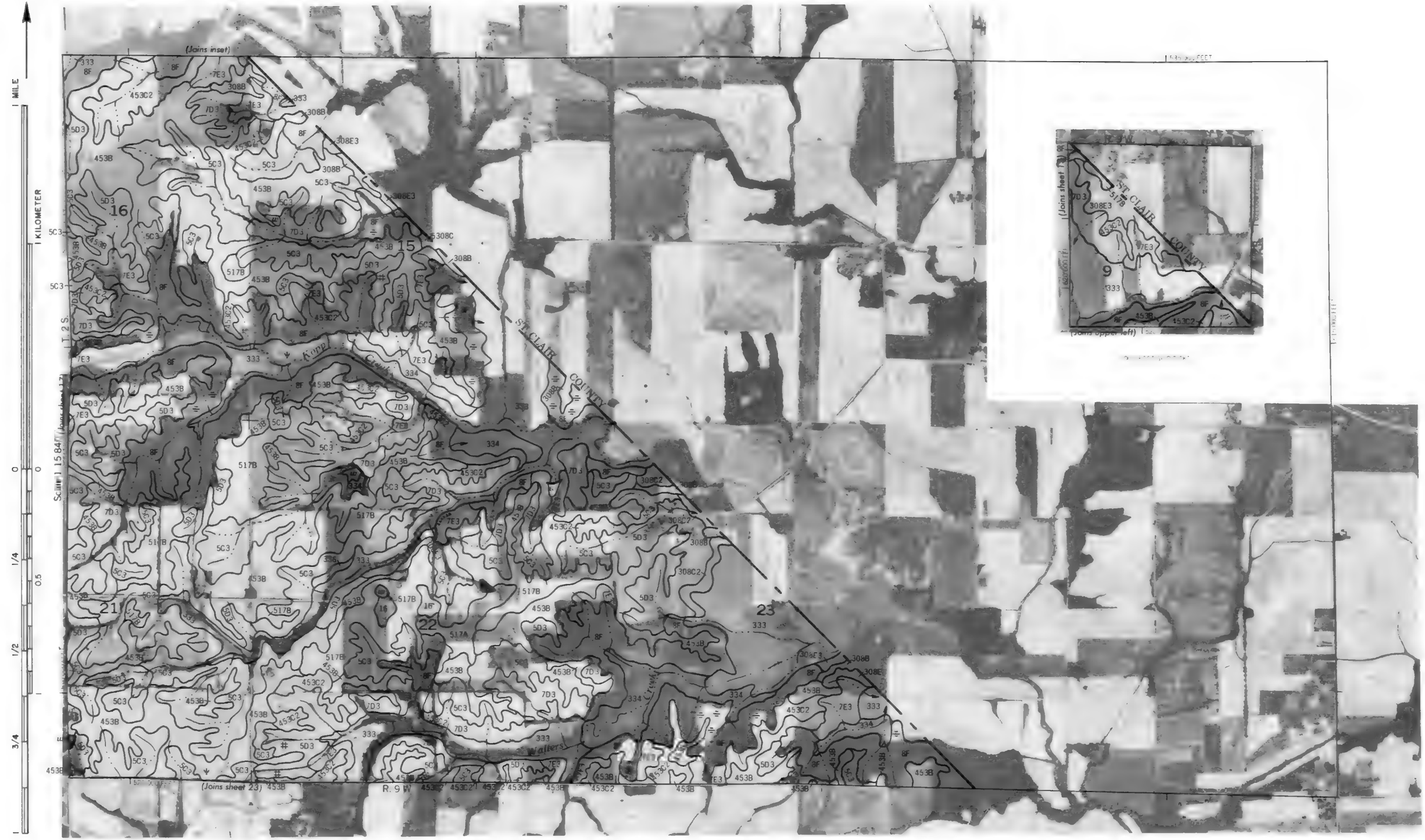
1 KILOMETER

Scale 1:15 840

0 0 1/4 0.5 1/2 3/4 1



N
1 MILE
1 KILOMETER
(Joins sheet 12)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 21)
R. 10 W.
T. 2 S.
Scale 1:15 840
Fountain Creek
Andys Run
water


18
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
0.5
1/4
1/2
3/4
T. 2 S.
R. 9 W
(Joins inset)
(Joins sheet 23)
(Joins sheet 17)
(Joins upper left)
ST. CLAIR COUNTY
Kopp Creek
Walters
16
15
21
22
23
9
333
334
453B
453C2
517B
517A
308B
308C2
308E3
5C3
5D3
7D3
7E3
8F


R. 11 W.
(Joins sheet 14)
(Joins inset sheet 1)
(Joins sheet 24)
FOUNTAIN CREEK
Moredock Lake
27
28
29
30
31
32
33
34
N
1 MILE
1 KILOMETER
Scale 1:15 840


20
N
1 MILE
1 KILOMETER
Scale 1 15 840
0
0
1/4
0.5
1/2
1
3/4
1
R. 11 W.
R. 10 W.
(Joins sheet 15)
(Joins sheet 19)
(Joins sheet 25)
(Joins sheet 21)
Moredock
Lake
Bonn
Creek
25
26
30
29
35
36
31
32
2 S.
302
304B
452A
591
1457
457
180
75C
75B
284
336
70
408
333
785G
274G
96F
308C2
5308E
5308G
308B
308D3
453B
453C2
5453C
308F
308E3
5308C
5453B 453B
226
87
156

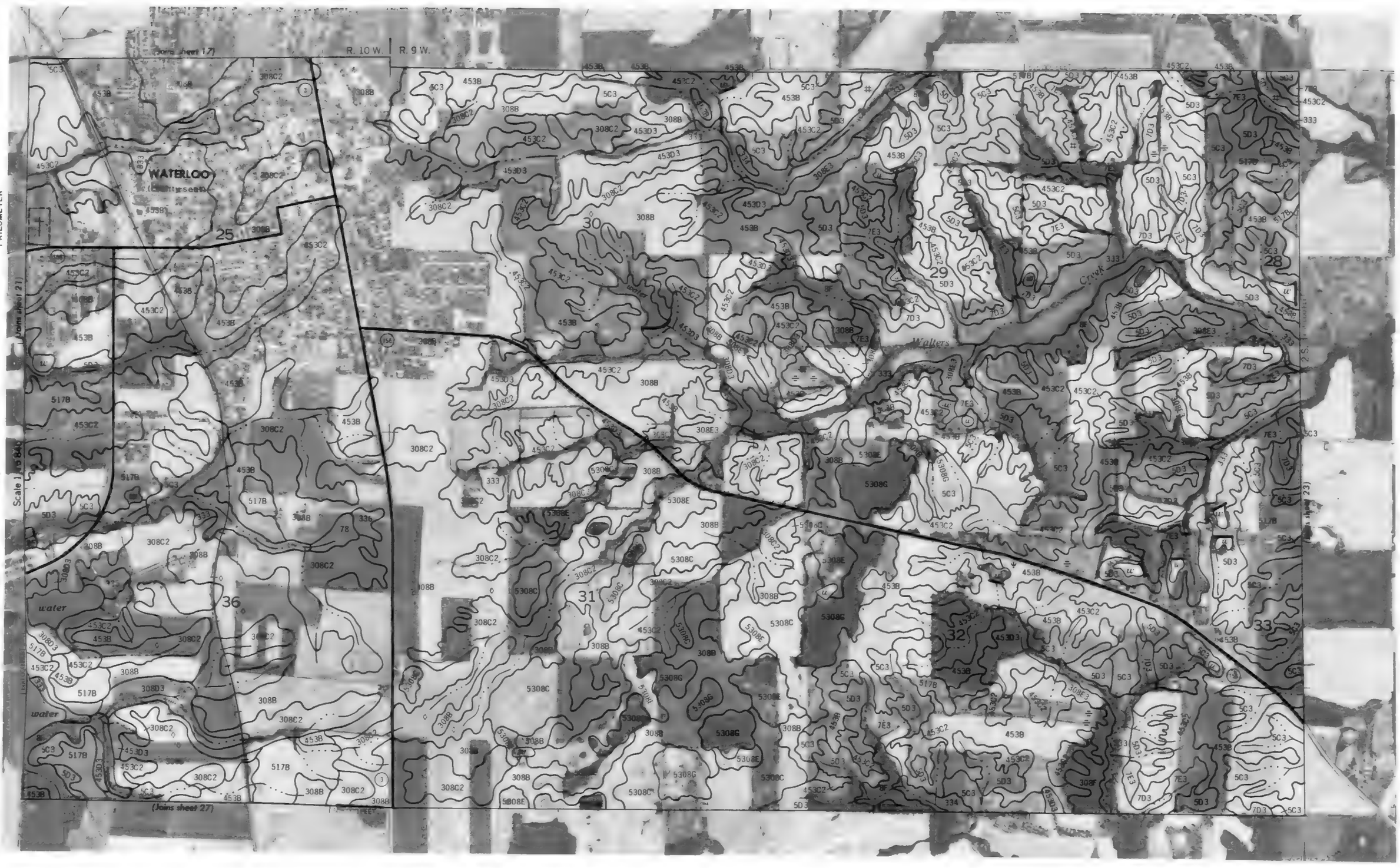
N

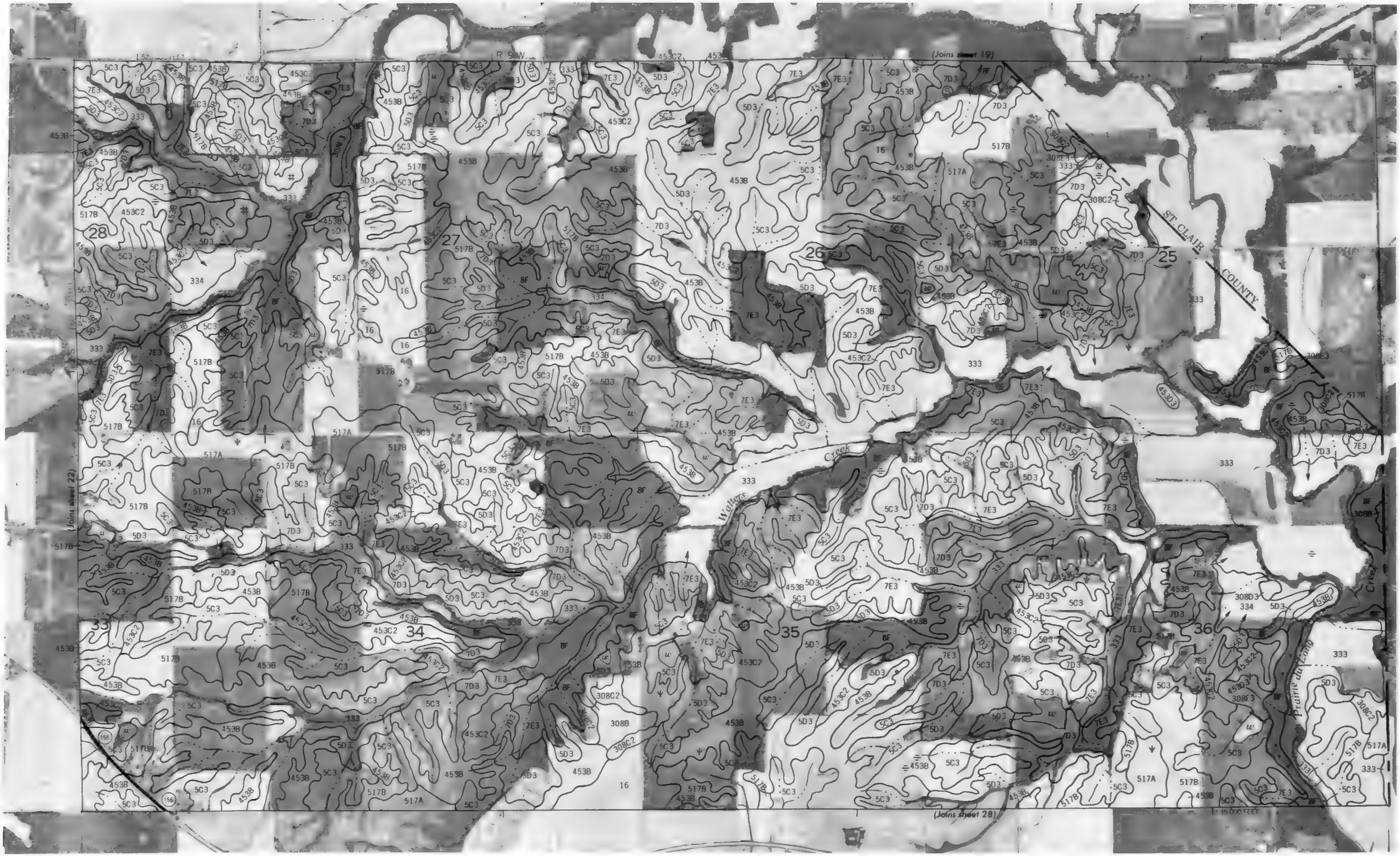
1 MILE

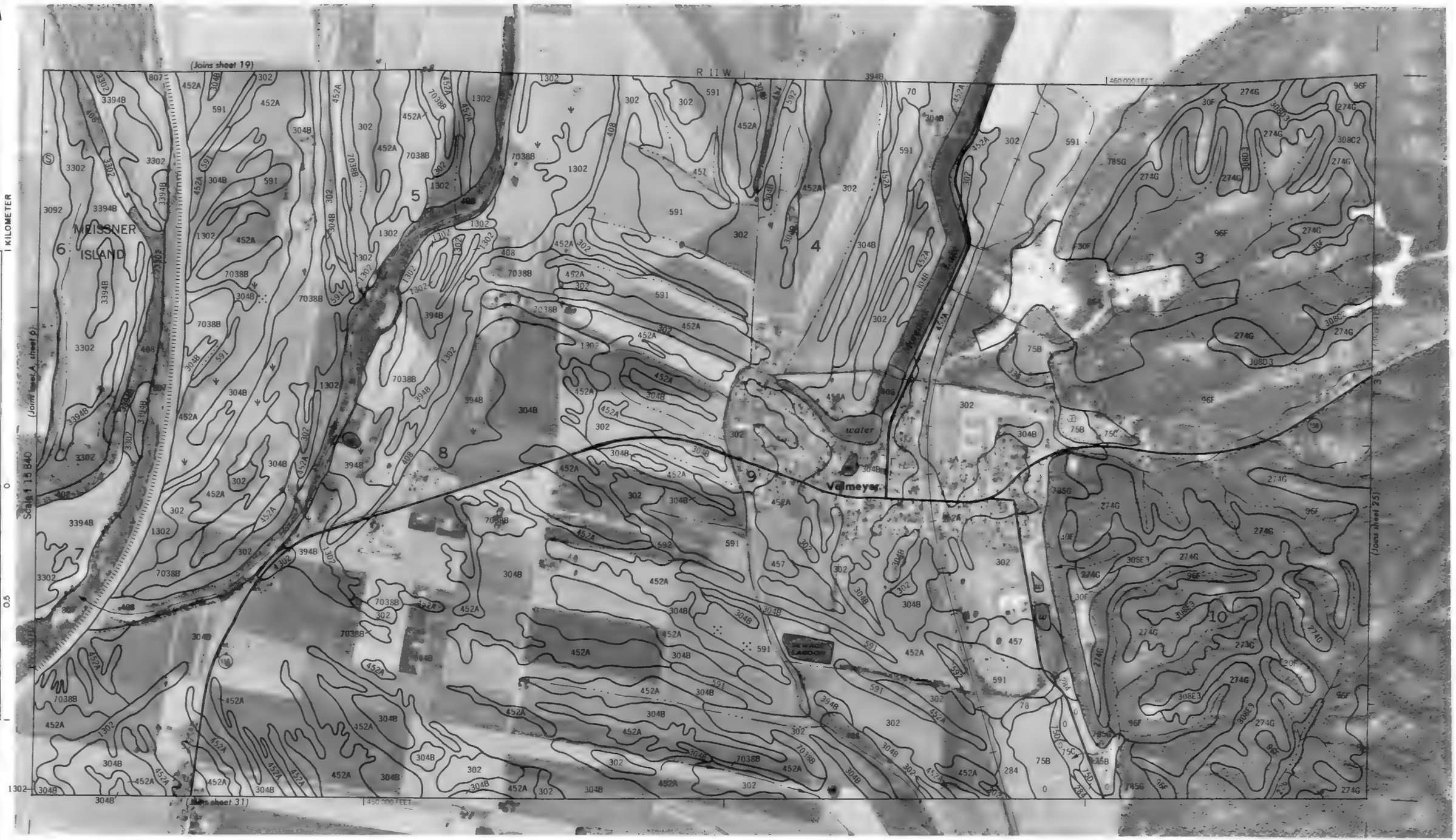
1 KILOMETER

Scale 1:15,840

0 0 1/4 0.5 1/2 3/4 1


N
1 MILE
1 KILOMETER
Scale 1 inch equals 660 feet
0
0.5
1/4
1/2
3/4
1
R. 10 W.
R. 9 W.
(Joins sheet 17)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 27)
WATERLOO
(County seat)
25
30
29
28
36
31
32
33
Walters
Creek
water
453B
453C2
453D3
308B
308C2
308D3
308E3
5308C
5308E
5308G
5C3
5D3
7D3
7E3
517B


23
N
R 9 W.
(Joins sheet 19)
(Joins sheet 22)
(Joins sheet 28)
ST. CLAIR COUNTY
Walters Creek
Prairie du Long Creek
28
27
26
25
33
34
35
36
1 MILE
1 KILOMETER
Scale 1:15 840
0
0.5
1
1/4
1/2
3/4
1 000 FEET




R 11 W
R 10 W
T 3 S
(Joins sheet 20)
(Joins sheet 24)
(Joins sheet 32)
N
1 MILE
1 KILOMETER
Scale 1 15 840
1/4
0.5
1/2
3/4
1000 FEET
water


26
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 21)
(Joins sheet 25)
(Joins sheet 33)
(Joins sheet 27)
R 10 W.
Bissell Lake
Wenburg
water
5308E
5308G
5308C
308B
308D3
308E3
453B
453C2
453D3
5C3
5D3
517B
517A
5453C
333
334
787
7E3
7D3
8F
16
2
3
4
5
8
9
10
11

27

N

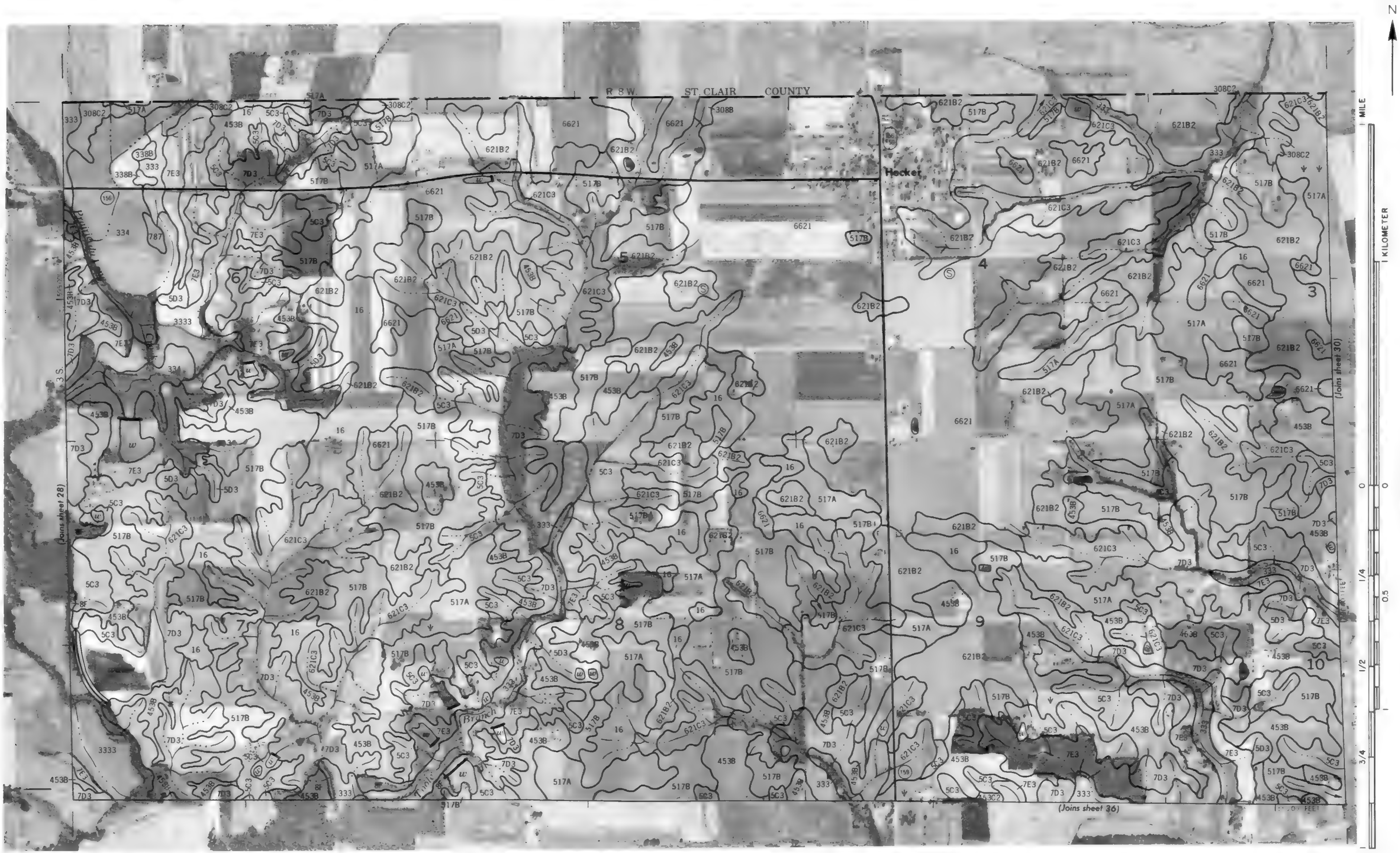
1 MILE

1 KILOMETER

Scale 1 15 840

0 0 1/4 0.5 1/2 1 3/4


N
1 MILE
1 KILOMETER
Scale 1 : 19 840
0
1/4
0.5
1/2
1
3/4
(Joins sheet 23)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 35)
R. 9 W.
T. 3 S.
water
Kaskaskia River
Crooked Creek
517B
517A
453B
5C3
5D3
7E3
988F
453C2
453D3
308E3
333
336
16
1
2
3
4
5
6
10
11
12


29
N
R 8 W.
ST. CLAIR COUNTY
Hecker
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 36)
1 MILE
1 KILOMETER
Scale 1:15 840

30

N

1 MILE

1 KILOMETER

Scale 1:15 840

0 0 1/4 0.5 1/2 3/4 1

ST. CLAIR COUNTY

R 8 W | R 7 W

ST. CLAIR COUNTY

RIVER

T 3 S

Kaskaskia

Stubblefield Lake

Richland

Creek

ST. CLAIR COUNTY

water

(Joins sheet 29)

(Joins sheet 37)

(Joins sheet A, sheet 23)

This soil survey map was compiled on 1979 aerial photographs by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners shown are approximately positioned


N
R 11 W.
T 3 S.
(Joins sheet 24)
(Joins inset, sheet 50)
(Joins sheet 38)
(Joins sheet 32)
Starrsonville
15
16
17
18
19
20
21
22
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5

32

N

1 MILE

1 KILOMETER

Scale 1:15 840

0 0.5 1

1/4 1/2 3/4

R. 11 W. | R. 10 W.

(Joins sheet 25)

(Joins sheet 31)

(Joins sheet 39)

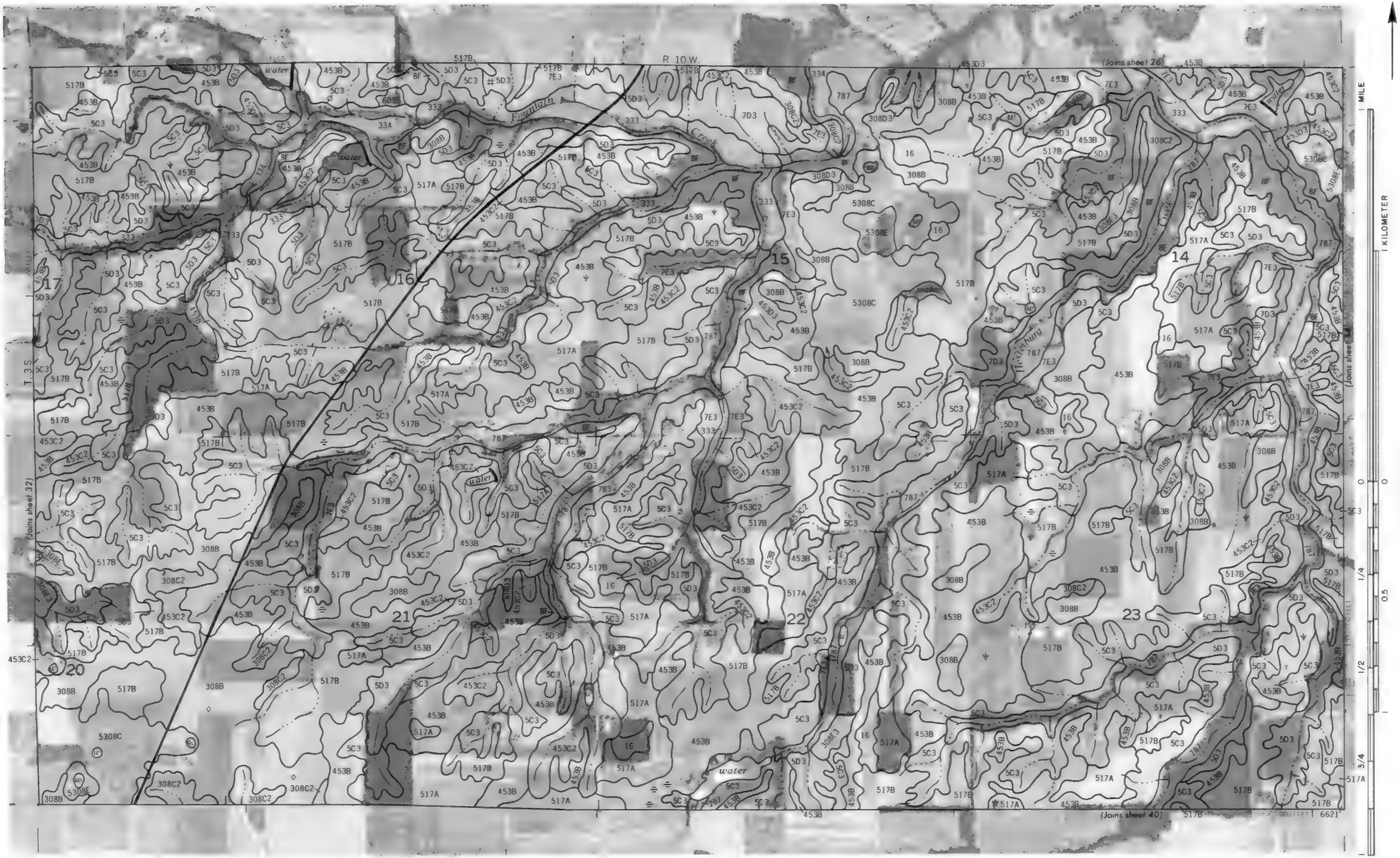
(Joins sheet 33)

Madonnaville

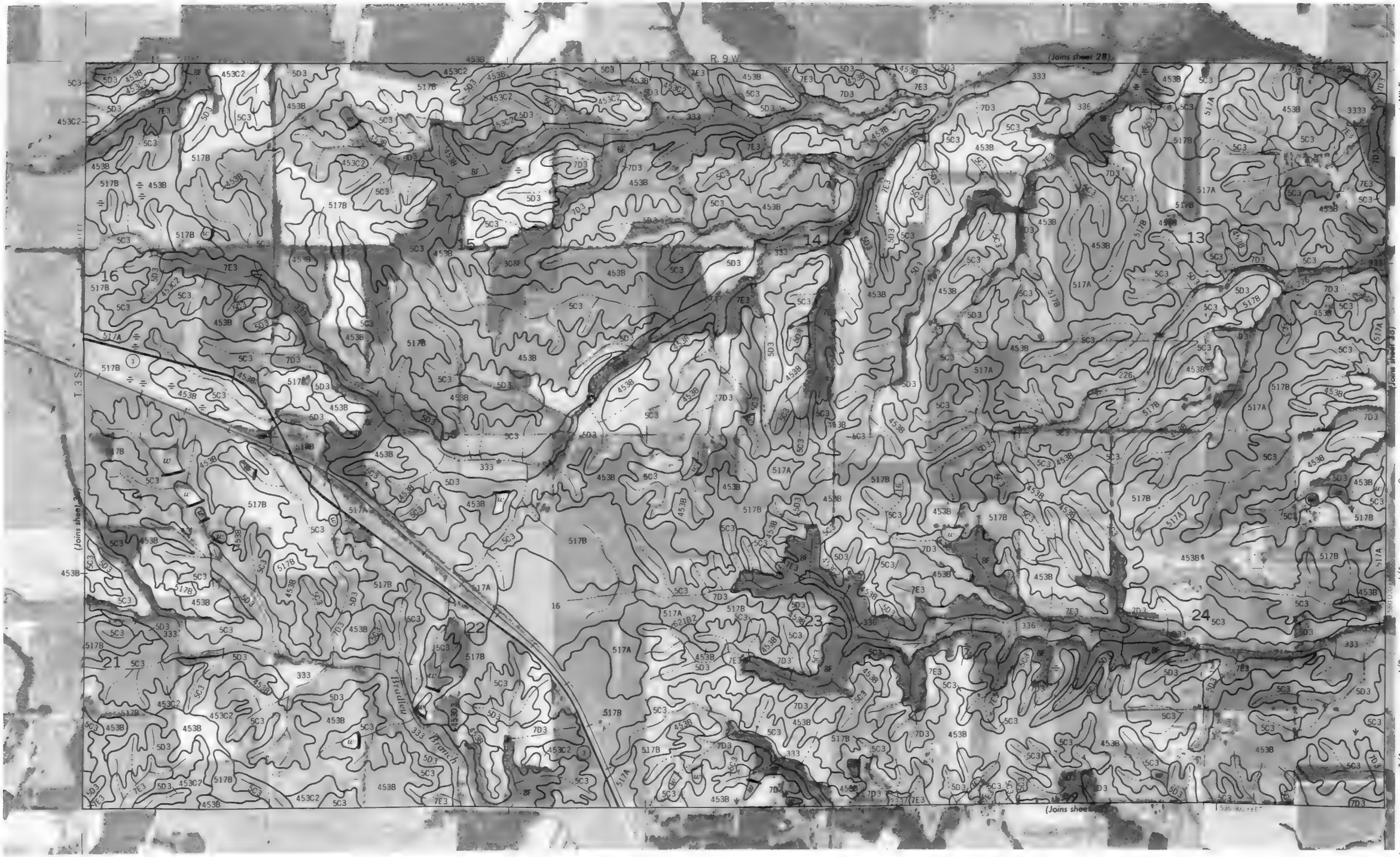
Monroe City

Monroe

13 14 18 17 23 24 19 20


N
R 10 W
T 3 S
(Joins sheet 26)
(Joins sheet 32)
(Joins sheet 40)
Fountain Creek
Hickory
water
15
16
17
14
21
22
23
20
MILE
KILOMETER
Scale 1 15 840
0
1/4
0.5
1/2
3/4
1
FEET
6621

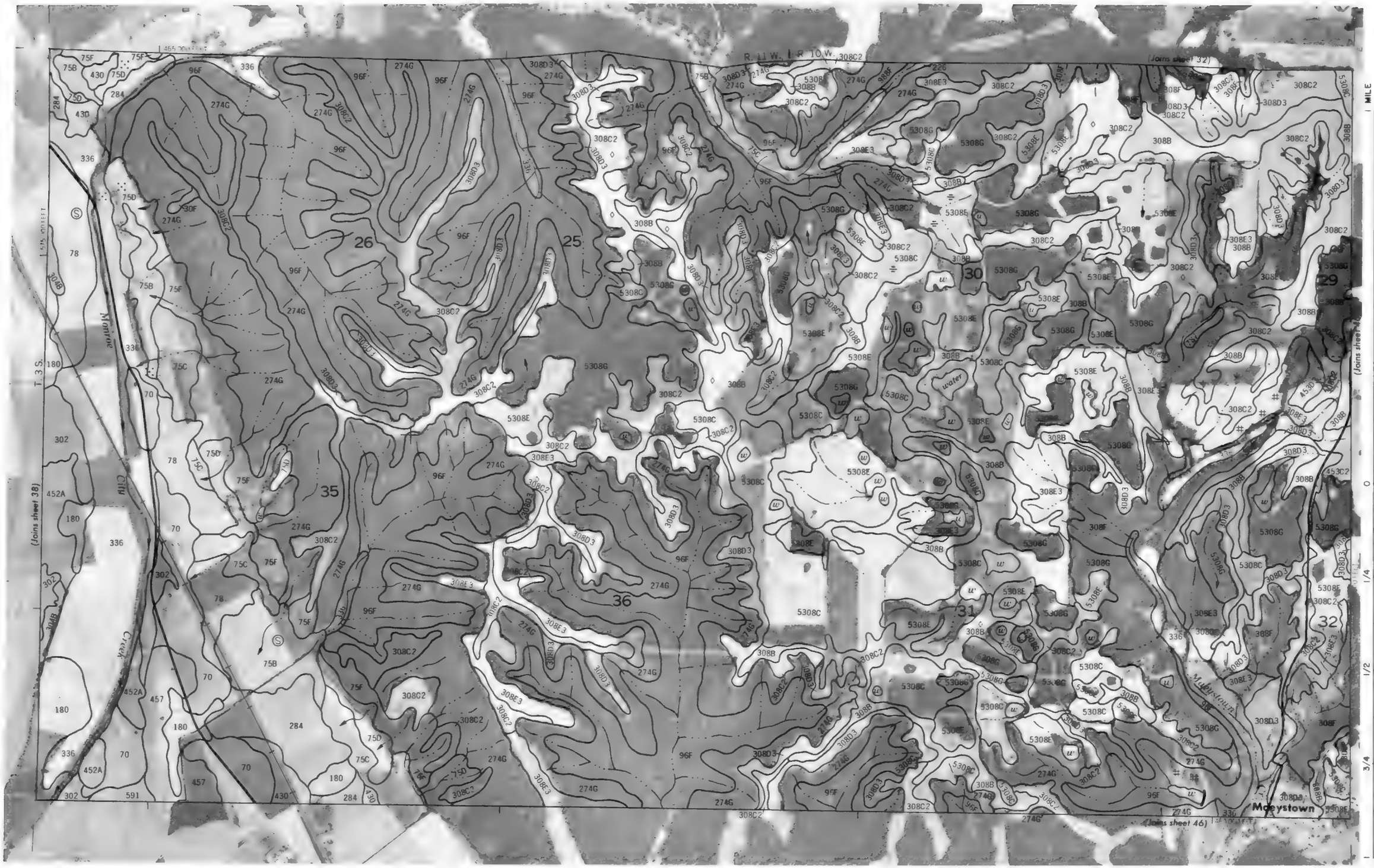

N
1 MILE
1 KILOMETER
Scale 1:15840
0
0.5
1/4
1/2
3/4
1
(Joins sheet 27)
(Joins sheet 33)
(Joins sheet 41)
(Joins sheet 35)
R. 10 W.
R. 9 W.
T. 3 S.
Burksville
May Design
13
18
17
16
19
20
21
24
6621
water
453B
453C2
308B
308C2
308E3
517B
517A
5C3
621B2
621C3
5453C
5308E
5308C
5453D3
7E3
5D3
8F

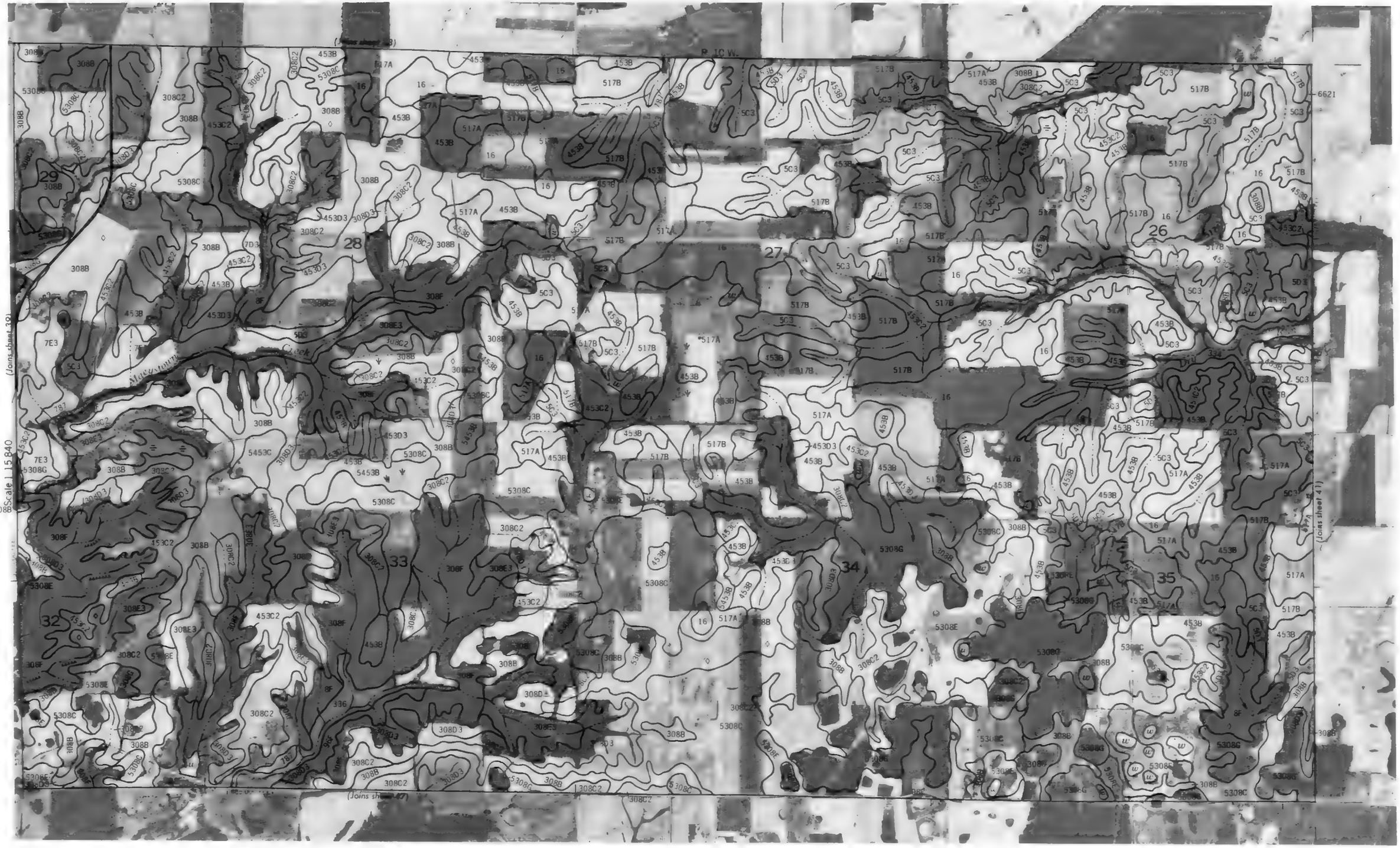

N
R. 9 W.
T. 3 S.
(Joins sheet 28)
(Joins sheet 34)
(Joins sheet 36)
Bradley Branch
13
14
15
16
21
22
23
24
1 MILE
1 KILOMETER
Scale 1 15 840

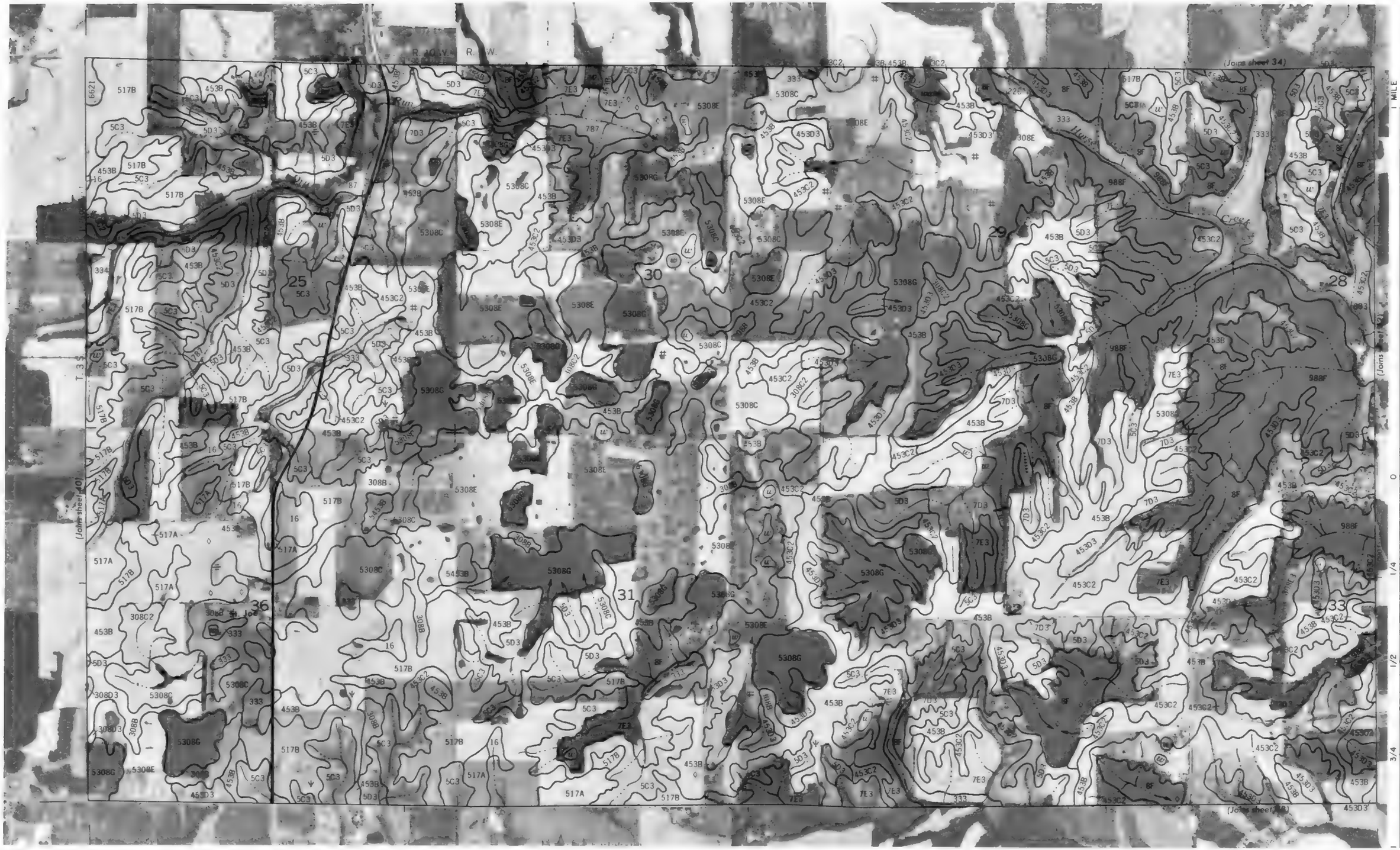

36
N
1 MILE
1 KILOMETER
Scale 1 15 840
0
1/4
0.5
1/2
1
3/4
R. 8 W
T 3 S.
(Joins sheet 29)
(Joins sheet 35)
(Joins sheet 43)
(Joins sheet 37)
Toole Branch
Richland Creek
18
17
16
15
19
20
21
22
517B
517A
453B
5C3
7D3
7E3
5D3
621C3
621B2
333
3333
3388
334
336
122B
8F

SOIL SURVEY OF MONROE COUNTY, ILLINOIS - SHEET NUMBER 38

This soil survey map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


39
N
R. 11 W. I R. 10 W.
T. 3 S.
Monroe City
Creek
Maeystown
(Joins sheet 38)
(Joins sheet 32)
(Joins sheet 46)
25
26
30
31
29
32
35
36
1 MILE
1 KILOMETER
Scale 1 15 840


40
N
1 MILE
1 KILOMETER
Scale 1:15840
0
0
1/4
0.5
1/2
3/4
1
R. 10 W.
6621
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 47)
Maeystown
Creek
26
27
28
29
32
33
34
35
308B
308C2
308D3
308E3
308F
453B
453C2
453D3
5308C
5308E
5308G
5C3
517A
517B
7D3
7E3
8F
16


41
N
R. 10 W.
R. 9 W.
T. 3 S.
(Joins sheet 34)
(Joins sheet 40)
(Joins sheet 40)
25
30
29
28
31
36
33
Run
Creek
1 MILE
1 KILOMETER
Scale 1:15 840

42

N

1 MILE

1 KILOMETER

Scale 1:15 840

0 0 1/4 0.5 1/2 1 3/4 1

(Joins sheet 35)

(Joins sheet 41)

(Joins sheet 49)

(Joins sheet 43)

R 9 W.

T. 3 S.

Water

Bradley Branch

Horse Creek

Rush

27 28 26 25 33 34 35 36

453B 453C2 453D3 5C3 5D3 7D3 7E3 8F 517A 517B 988F 308E3 333 334 16 621B2 621C3 787

N

R7W R8W

RANDOLPH COUNTY

Black Creek

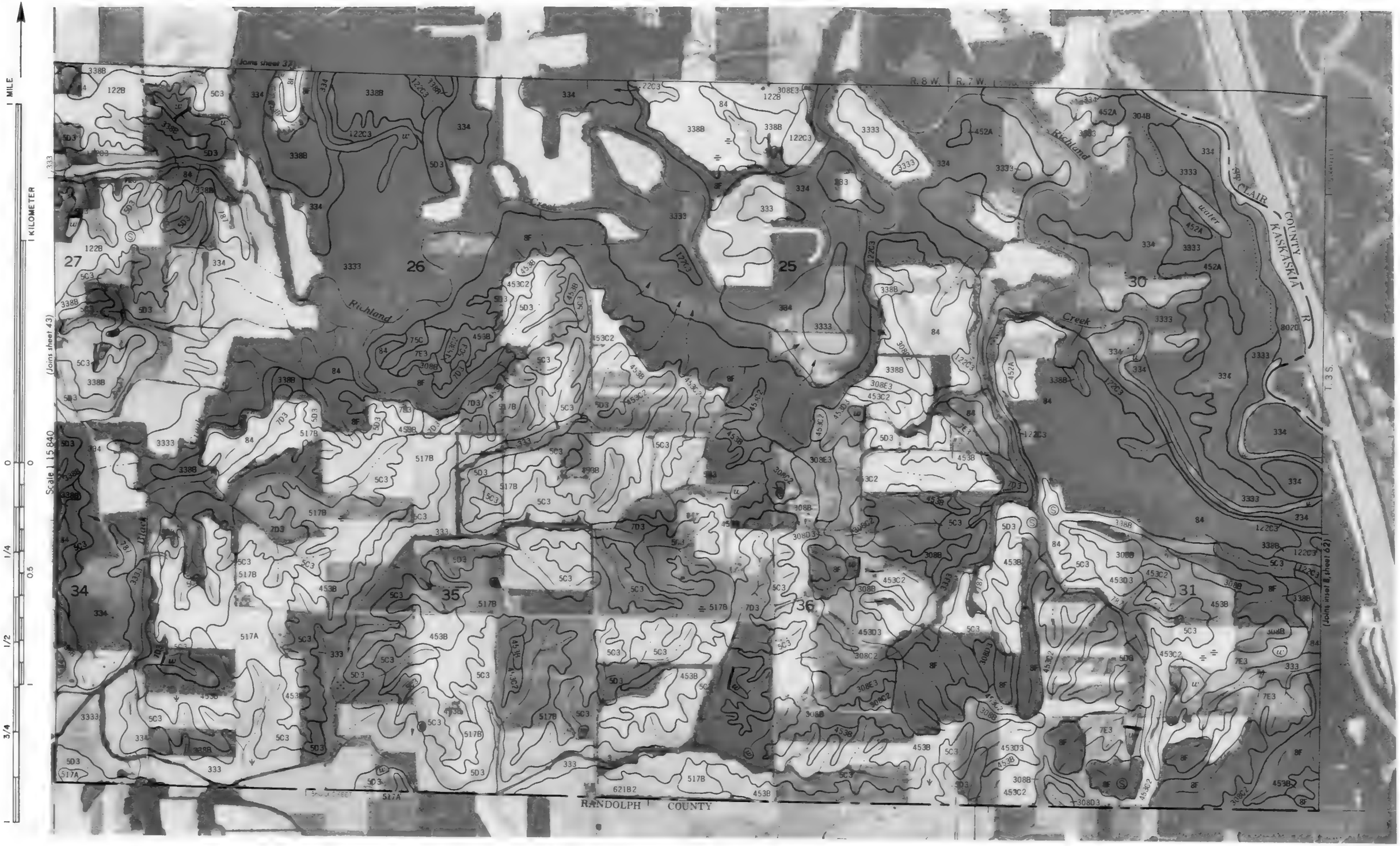
1 MILE

1 KILOMETER

Scale 1 15 840

0 1/4 1/2 3/4 1

0 0.5 1


44
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
0
1/4
0.5
1/2
1
3/4
1
(Joins sheet 37)
(Joins sheet 43)
(Joins sheet 45)
R. 8 W.
R. 7 W.
T. 3 S.
26
27
25
30
34
35
36
31
Richland Creek
Richland Creek
Silver Creek
ST CLAIR COUNTY
KASKASKIA R
RANDOLPH COUNTY
BROCK STREET
122B
122C3
127C3
308E3
308B
308C2
308D3
453B
453C2
453D3
452A
304B
8020
621B2
517A
517B
5C3
5D3
7D3
7E3
75C
84
333
334
338B
3333
8F

R 11 W

(Joins sheet 38)

(Joins sheet 50)

CALICO ISLAND

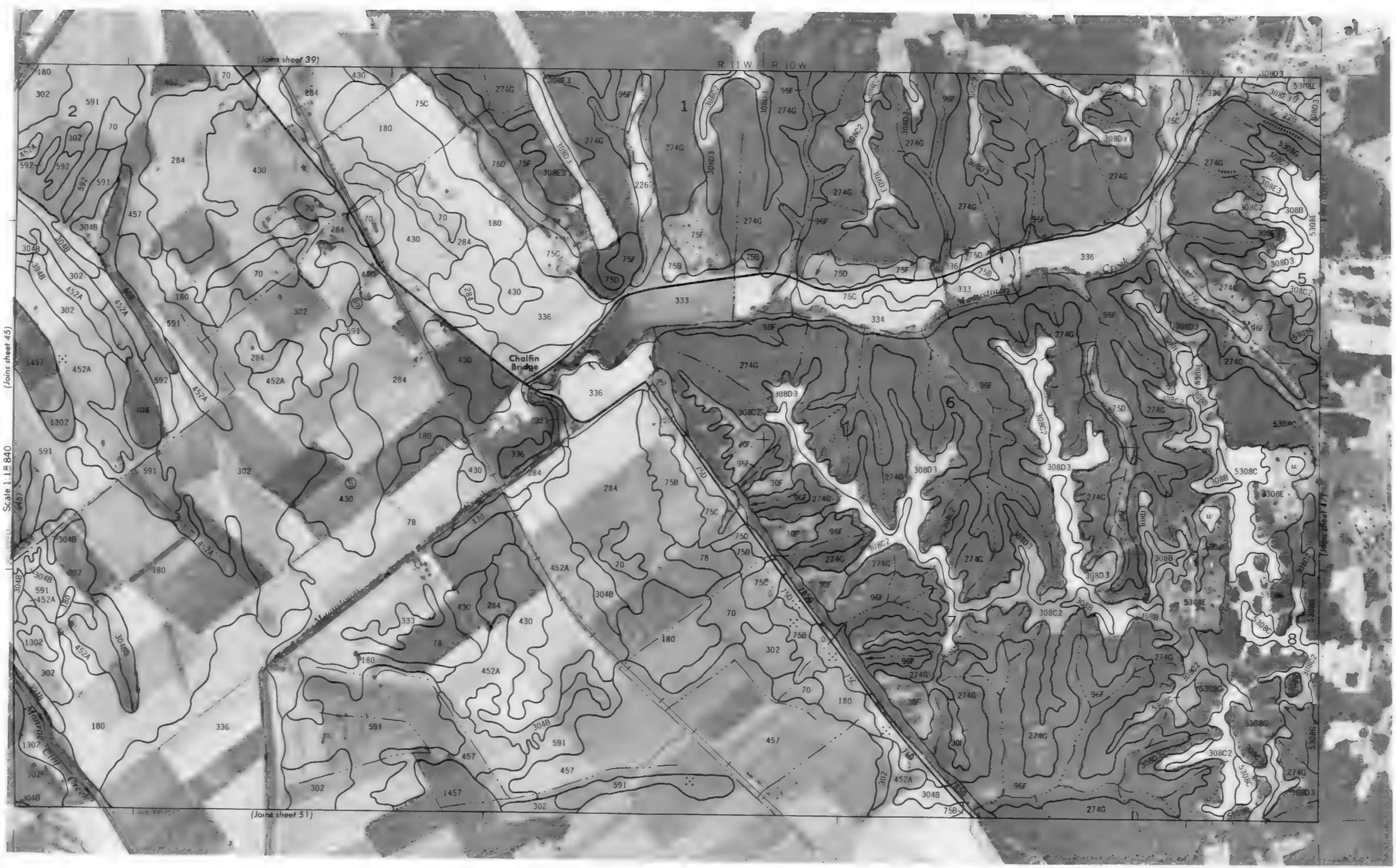
MISSISSIPPI — JEFFERSON COUNTY — MISSOURI RIVER

Creek

Scale 1:15 840

1 MILE

1 KILOMETER


N
1 MILE
1 KILOMETER
Scale 1:15840
0
0
1/4
0.5
1/2
1
3/4
(Joins sheet 39)
(Joins sheet 45)
(Joins sheet 51)
R. 11 W
R. 10 W
Chalfin Bridge
Monroe Cem
Creek
1
2
5
6
7
8

47

N

R. 10 W.

(Joins sheet 40)

(Joins sheet 46)

(Joins sheet 52)

water

1 MILE

1 KILOMETER

Scale 1 15 840

48

N

1 MILE

1 KILOMETER

Scale 1:15 840

0 0 1/4 0.5 1/2 1 3/4 1

(Joins sheet 47)

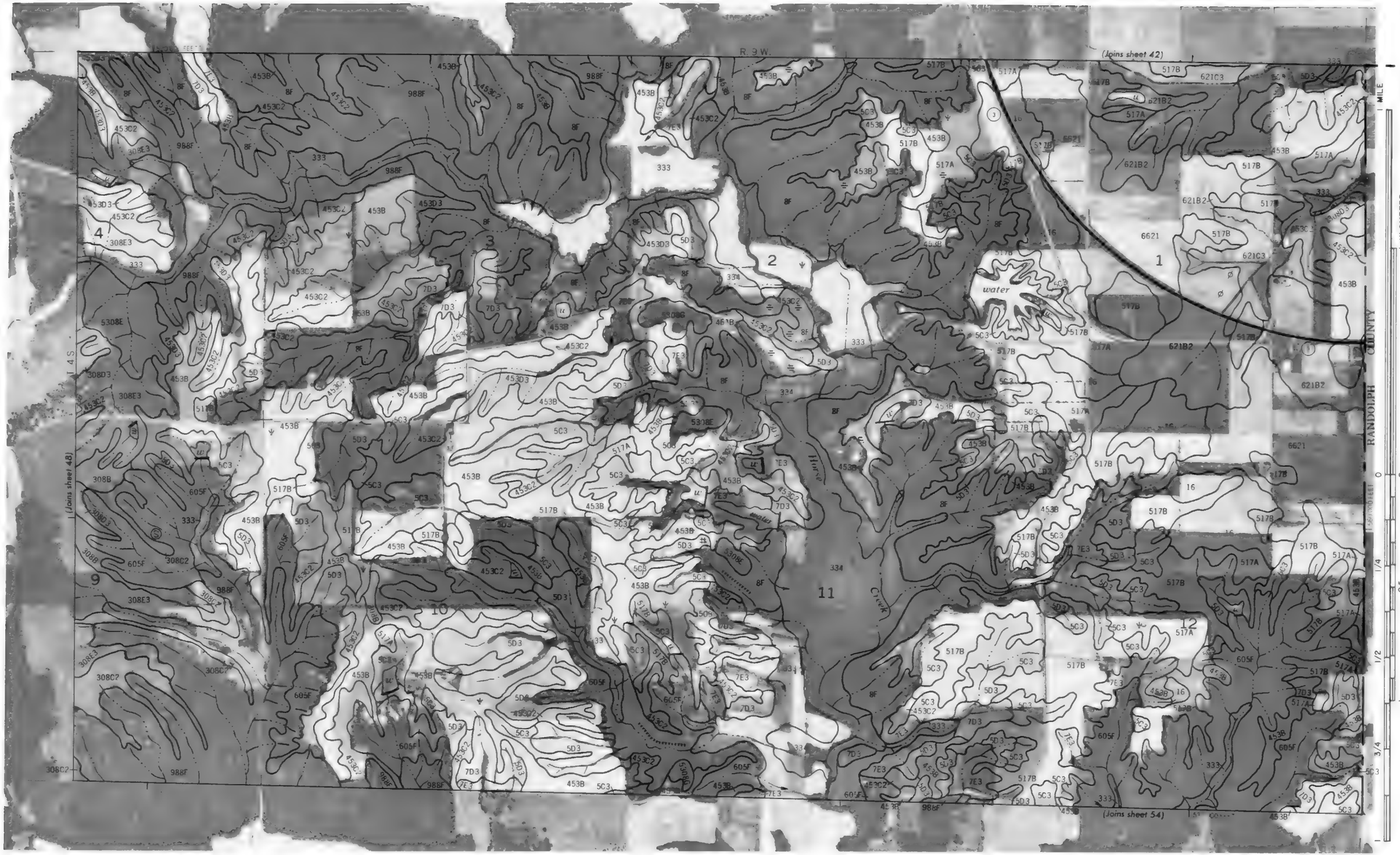
(Joins sheet 41)

R 10W R 9W

T 4 S

(Joins sheet 49)

(Joins sheet 33)


R. 9 W.
T. 4 S.
(Joins sheet 42)
(Joins sheet 48)
(Joins sheet 54)
RANDOLPH COUNTY
water
Horse Creek
N
1 MILE
1 KILOMETER
Scale 1 15 840

50

N

1 MILE

1 KILOMETER

Scale 1:15 840

0 0 1/4 0.5 1/2 1 3/4

R. 11 W.

T. 4 S.

(Joins sheet 45)

(Joins sheet 51)

(Joins sheet 31)

443 000 FEET

MISSISSIPPI RIVER

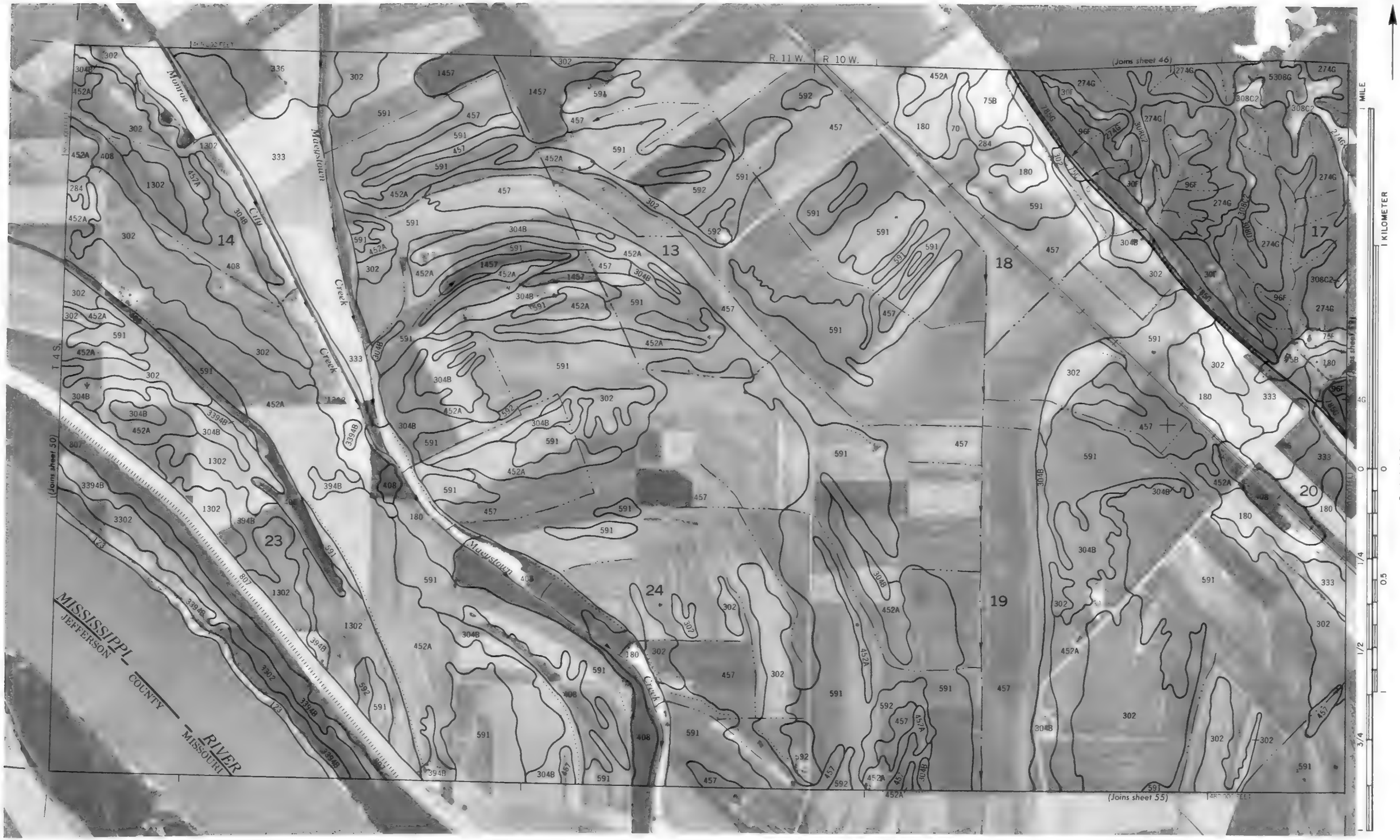
JEFFERSON COUNTY

MISSOURI RIVER

water

17 16 15 18 19 22

123 3092 3302 3394B 408 w 591 457 452A 302 1302 3048 284 70


N
R. 11 W.
R 10 W.
T 4 S.
(Joins sheet 46)
(Joins sheet 50)
(Joins sheet 55)
Monroe City
Marsh town Creek
Muddy town Creek
MISSISSIPPI
JEFFERSON COUNTY
RIVER
MISSOURI
13
14
17
18
19
20
23
24
1 MILE
1 KILOMETER
Scale 1:15 840

52

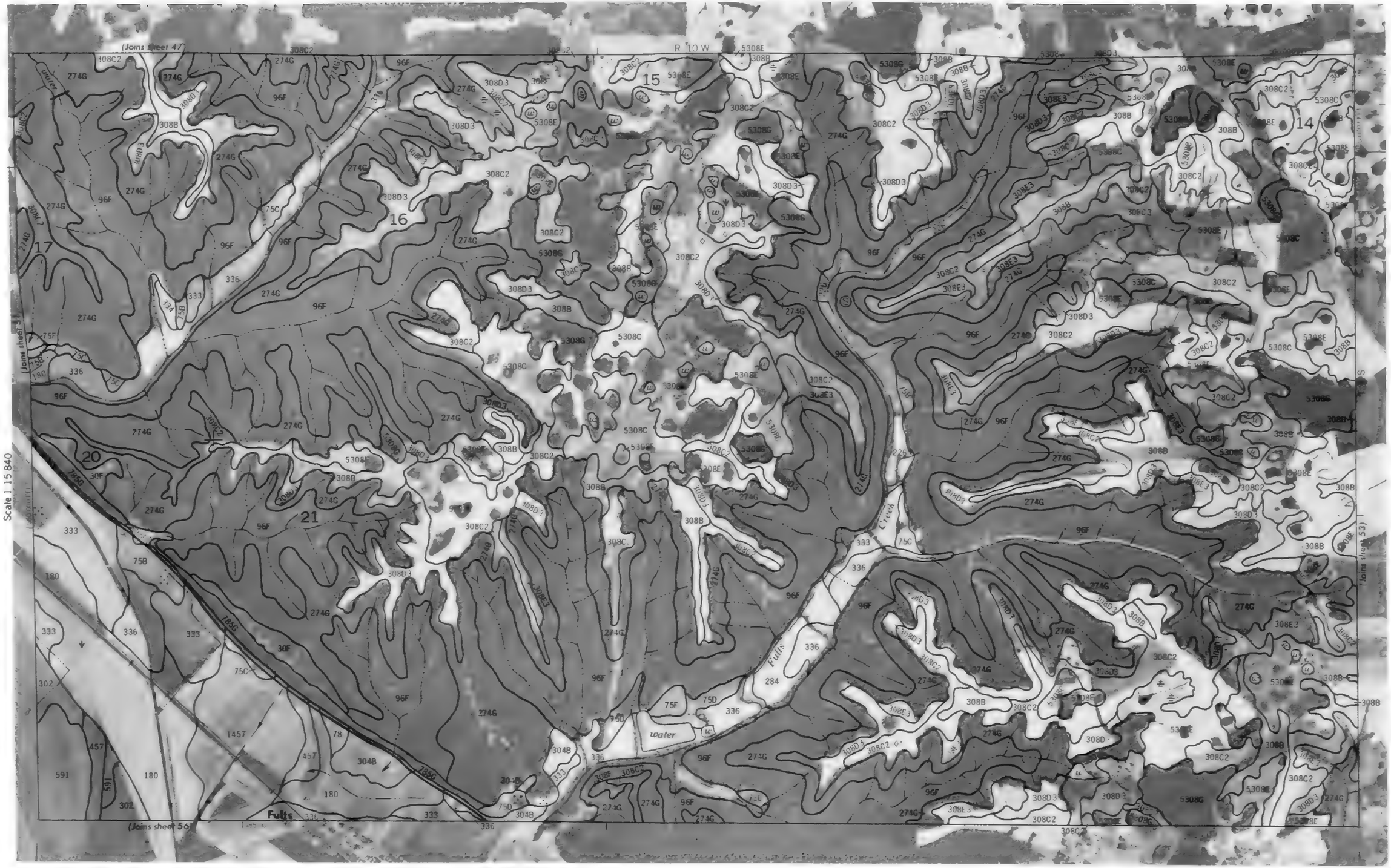
N

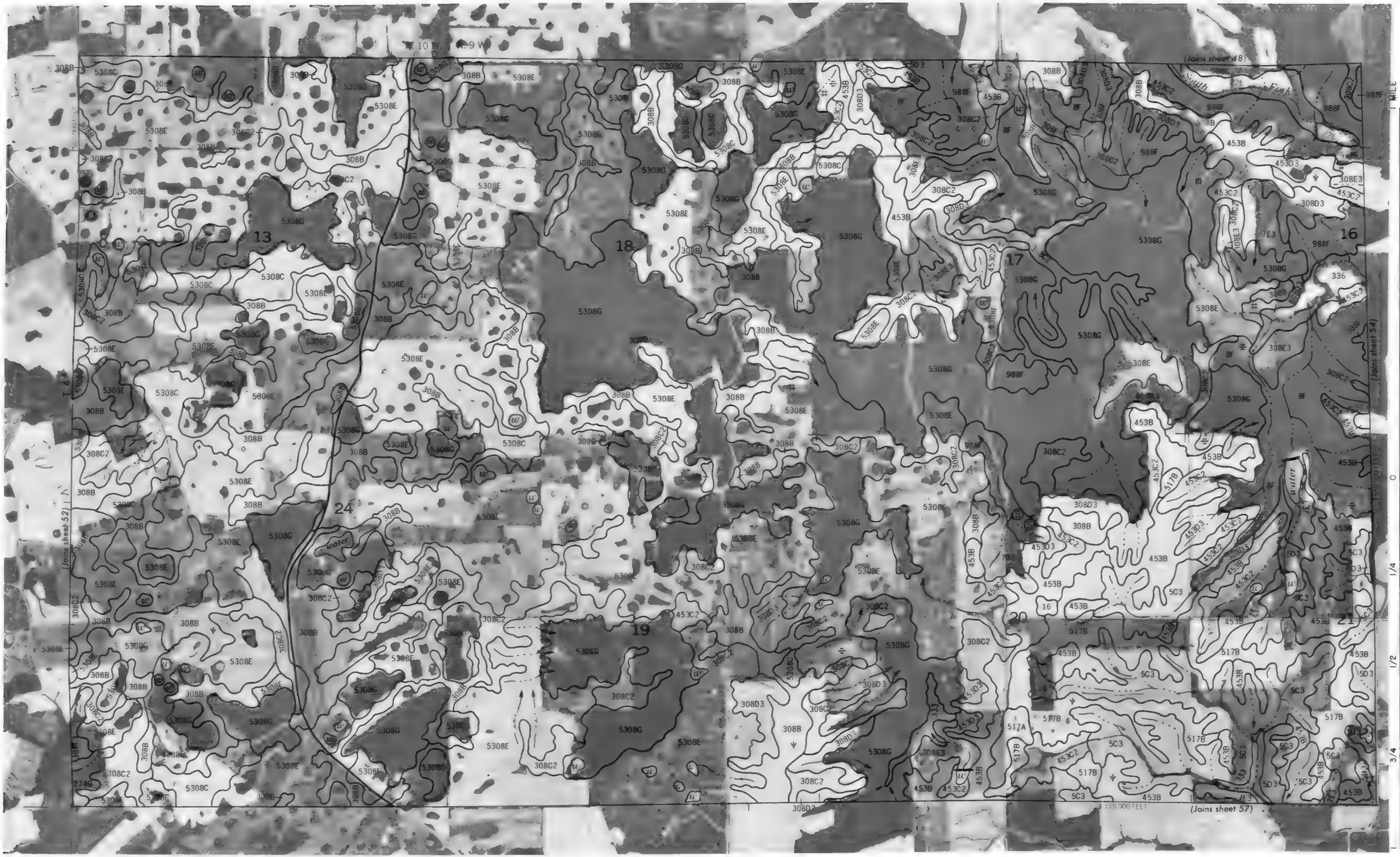
1 MILE

1 KILOMETER

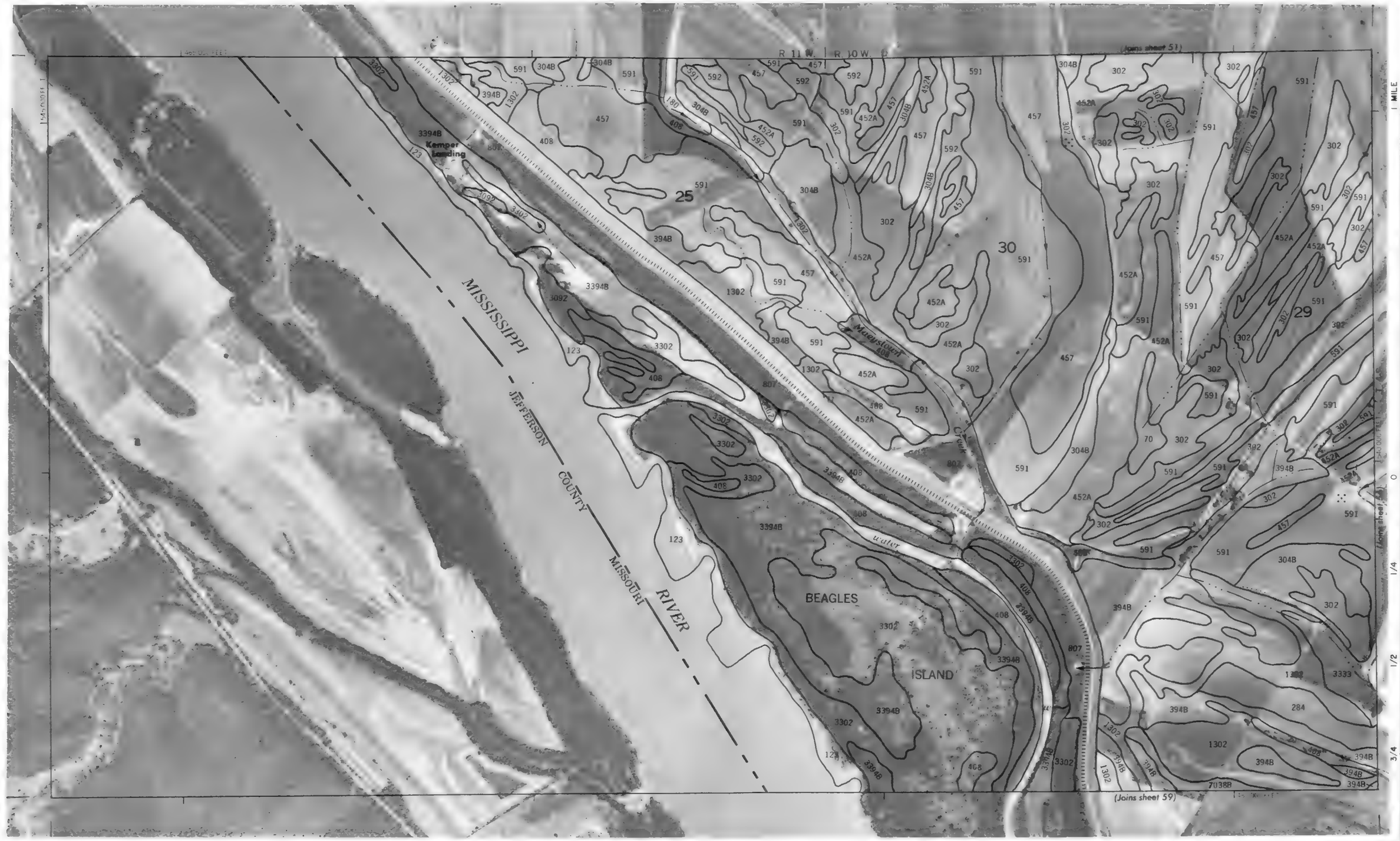
Scale 1 15 840

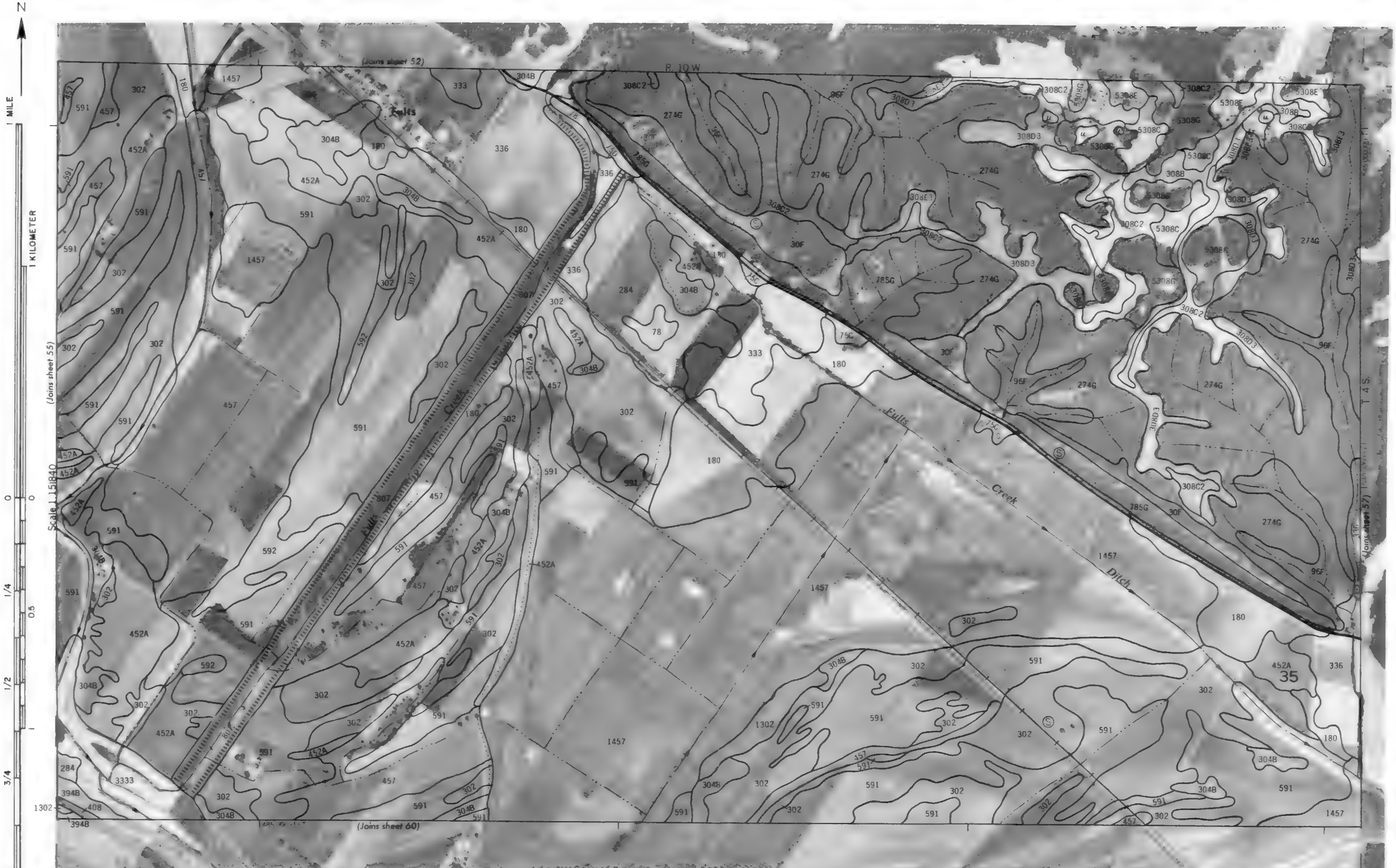
0 0 1/4 0.5 1/2 1 3/4 1




N
W 10
W 9
(Joins sheet 48)
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 57)
13
18
17
16
24
19
20
21
5308G
5308E
5308C
308B
308C2
308D3
308E3
453B
453C2
453D3
988F
988E
5C3
5D3
517A
517B
336
water
1 KILOMETER
MILE
Scale 1 15 840
0
0.5
1
1/2
1/4
3/4

SOIL SURVEY OF MONROE COUNTY, ILLINOIS - SHEET NUMBER 54


55
N
R 11 W.
R 10 W.
(Joins sheet 51)
(Joins sheet 59)
MISSISSIPPI
JEFFERSON COUNTY
MISSOURI
RIVER
BEAGLES
ISLAND
Kemper landing
Meeks Court
Creek
water
25
30
29
1 MILE
1 KILOMETER
Scale 1 15 840


N
1 MILE
1 KILOMETER
0
1/4
0.5
1/2
3/4
1
Scale 1:15 840
(Joins sheet 52)
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 60)
R. 10 W.
T. 4 S.
Fults
Fults Creek
Fults Creek Ditch
35


R. 10 W.
R. 9 W.
T. 4 S.
(Joins sheet 53)
(Joins sheet 56)
(Joins sheet 58)
(Joins sheet 61)
Renault
25
30
29
28
36
31
32
33
N
1 MILE
1 KILOMETER
Scale 1:15 840

58

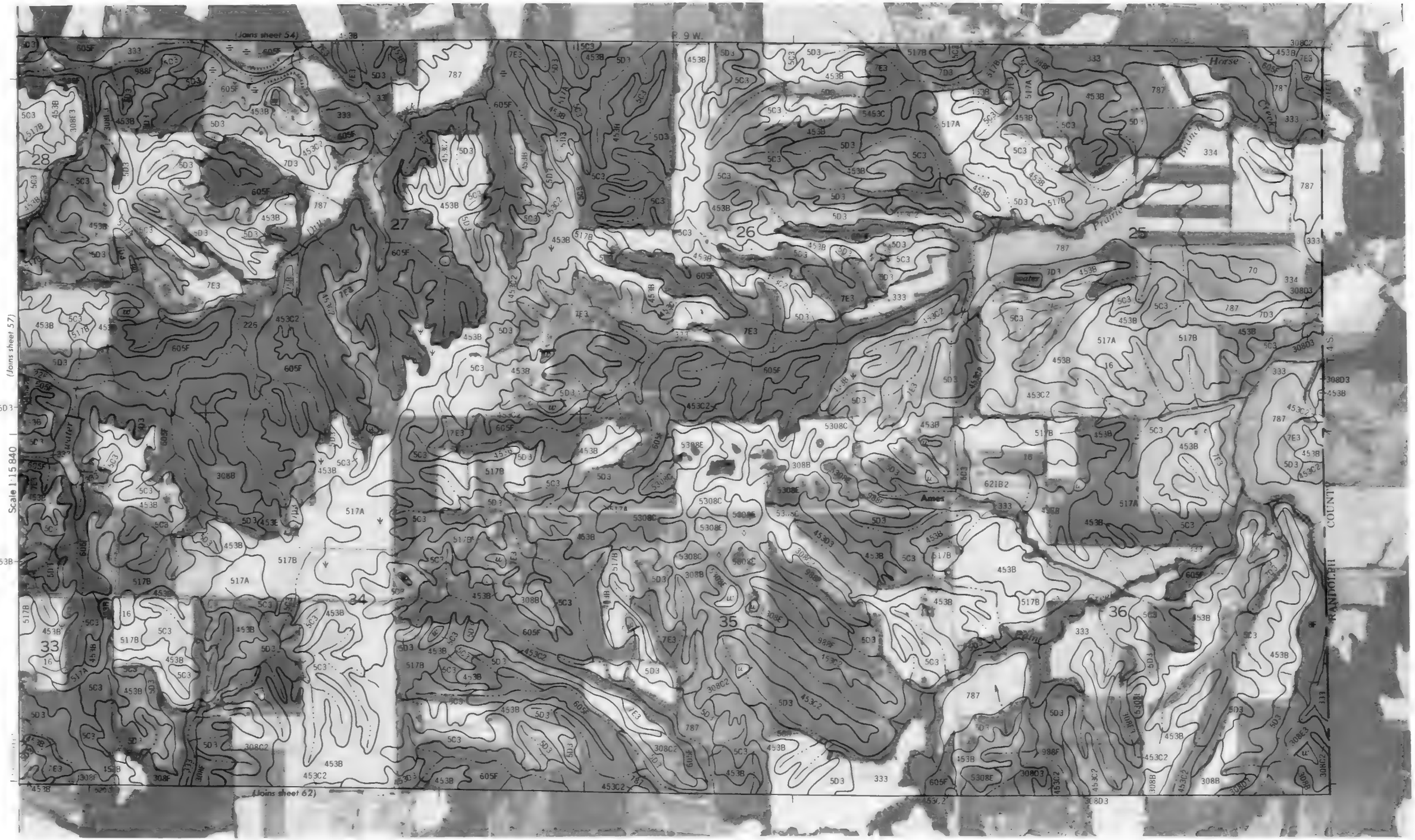
N

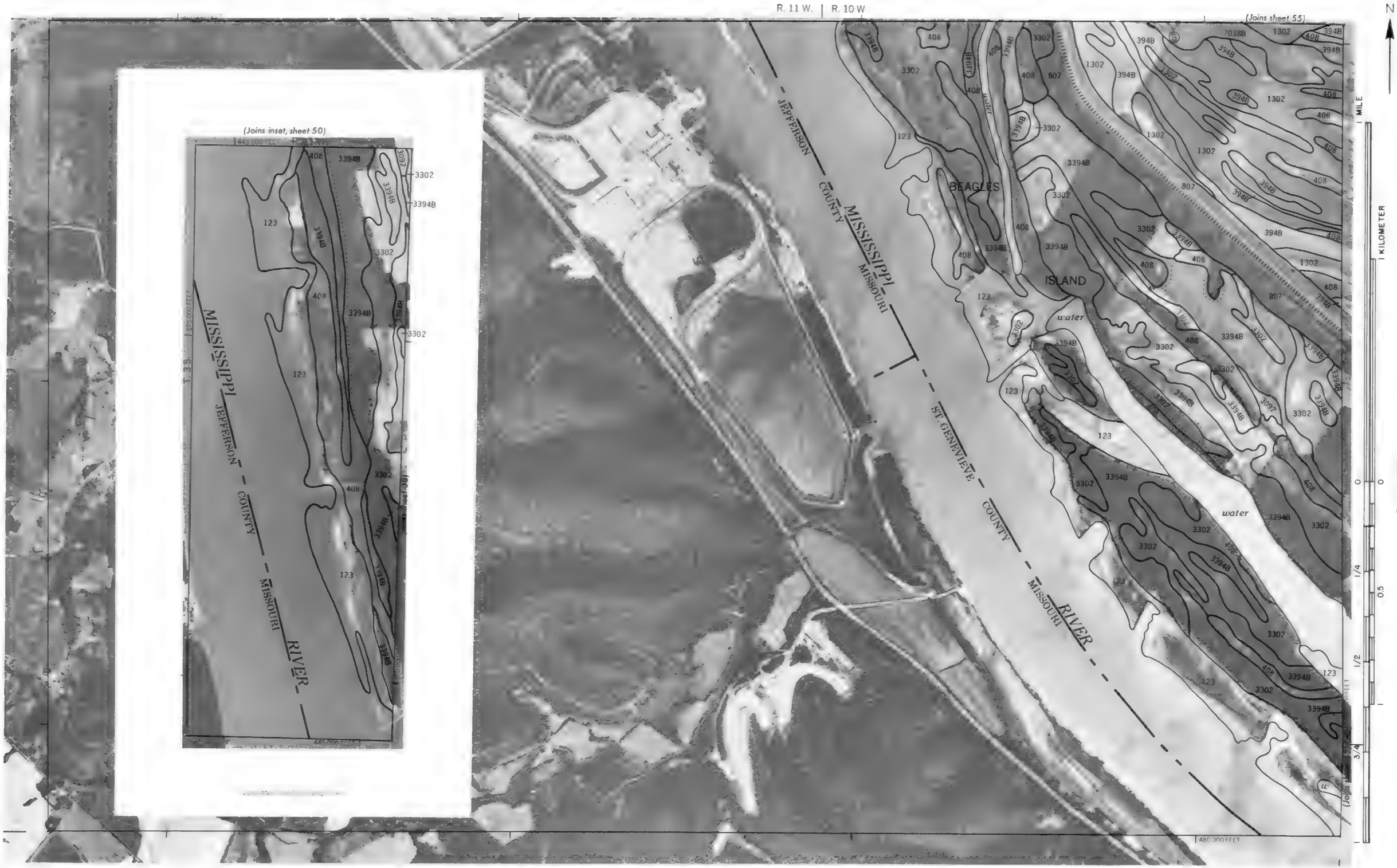
1 MILE

1 KILOMETER

Scale 1:15 840

0 0 0.5 1/4 1/2 3/4 1




R. 11 W.
R. 10 W
(Joins sheet 55)
(Joins inset, sheet 50)
443 000 FEET
575 000 FEET
T. 3 S.
JEFFERSON COUNTY
MISSISSIPPI
MISSOURI
ST. GENEVIEVE COUNTY
RIVER
BEAGLES
ISLAND
water
123
408
807
1302
3302
3394B
3092
7038B
480 000 FEET
N
1 MILE
1 KILOMETER
Scale 1 15 840

60

N

1 MILE

1 KILOMETER

0 1/4 1/2 3/4 1

0 0.5 1

(Joins sheet 56)

R. 10 W.

500 000 FEET

(Joins sheet 59)

(Joins sheet 63)

(Joins sheet 61)

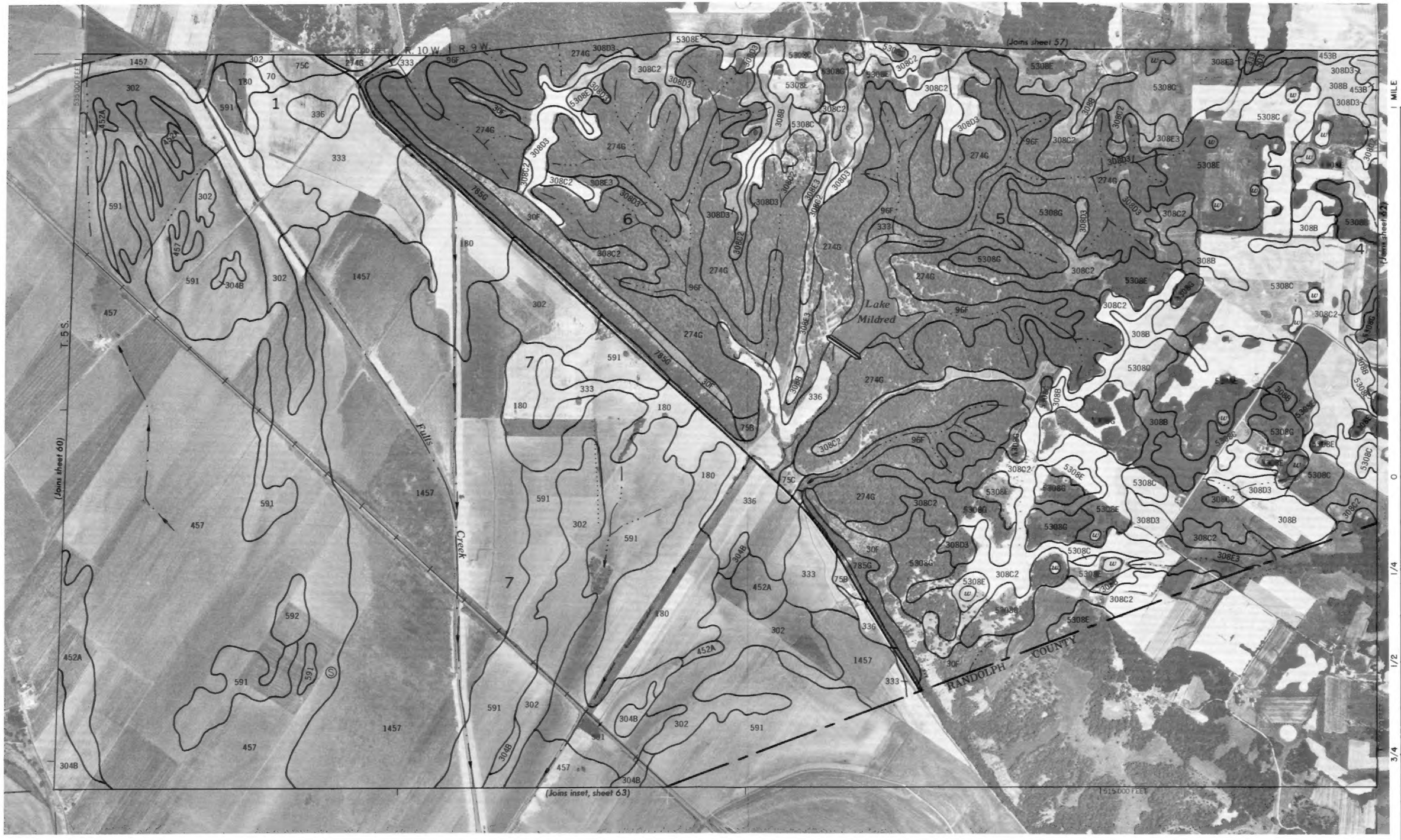
T. 5 S.

Fults Creek

Kidd

2

11



62

N

Scale 1:15 840

1 MILE

1 KILOMETER

0 1/4 0.5 1/2 3/4 1

(Joins sheet 58)

(Joins sheet 61)

R. 9 W.

T. 5 S.

535 000 FEET

530 000 FEET

525 000 FEET

520 000 FEET

Paint Creek

RANDOLPH COUNTY

INSET A

INSET B

R. 7 W.

KASKASKIA

ST. CLAIR COUNTY

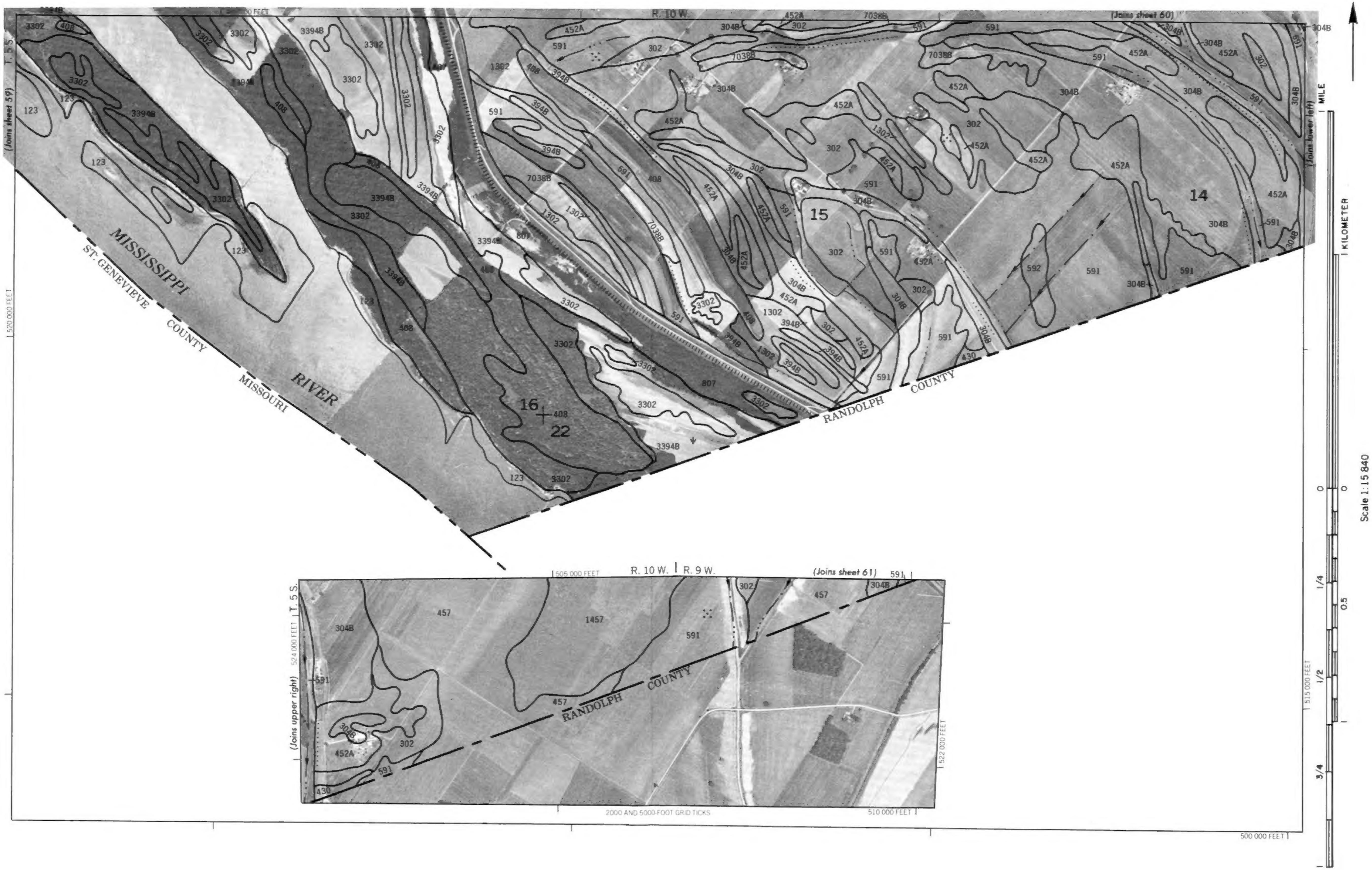
RIVER

RANDOLPH COUNTY

2000-FOOT GRID TICKS

2000-FOOT GRID TICKS

This soil survey map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned



This soil survey map is compiled on 1979 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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